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A FURTHER REPORT

Of the Survey of a Rail-Road from Chambersburg to Pittsburg, with an estimate of the cost of the work: Also, a further Report of the Survey of the Raystown branch of the Juniata river, with an estimate of the cost of the work, by HOTHER HAGE.

AND THE

REPORT

Of CHARLES DE HASS, Engineer, accompanied with a Survey and Estimate of the cost of constructing a McAdamized or Block road from Laughlinstown to Chambersburg.

READ IN THE HOUSE OF REPRESENTATIVES, JANUARY 28, 1839.

HARRISBURG:
PRINTED BY BOAS AND COPLAN.
...
1838.

REPORT.

To the Board of Canal Commissioners of Pennsylvania.

Gentlemen—In my last report to the Board I submitted a general description of the route examined for a rail-road from Chambersburg to Pittsburg, as well as a slack water navigation on the Raystown Branch of the Juniata river, from the coal and iron region of Bedford county to the Pennsylvania canal.

Having since completed the maps, profiles, and estimates relating to both these improvements, I have the honor to present a more detailed report on each survey.

THE CHAMBERSBURG AND PITTSBURG RAIL-ROAD.

One of the most important duties devolving after the field operations of a survey have been completed, consists in re-arranging all the data obtained, closely studying the obstacles of magnitude, and modifying them into a diversity of relative combinations, in order that the most judicious plan may be deduced for the work in contemplation. It is by this operation that the gradients and curvatures are adapted to the opposing obstacles of the ground, and the plans for the different structures finally determined.

The manner in which this task has been accomplished, properly belongs to the present report. The region over which the line passes makes long ascents and descents unavoidable, and it is for the purpose of obtaining these, sufficiently gentle for the effective use of locomotive power, that the increase of distance, in a great measure, is to be attributed. From the annexed tabular form of the grades adopted, their different lengths may be arranged in the following manner:

1350.30 chains are perfectly level, or	16 miles	70.30 ch'ns.		
Not exceeding 10 ft. per mile 902 chains ascending and 634 descending,	19	"	16	"
Not exceeding 20 feet per mile 1043 chains ascending and 2146 descending,	39	"	69	"
Not exceeding 30 feet per mile 989 chains ascending and 404.22 descending,	17	"	34.22	"

Dec. 2, 1934 Kress Foundation Gift (Shea)

Not exceeding 40 feet per mile 915.23 chains ascending and 1040.29 descending,	24	"	35.52	"
Not exceeding 50 feet per mile 1682 ch'ns ascending and 1660 descending,	41	"	62	"
Not exceeding 60 ft. per mile 3405.36 chains ascending and 3069.60 descending,	80	"	74.96	"
Total length of road,	240 miles 42 chains.			

From this it will be seen that somewhat more than half the length of the line is graded at an inclination exceeding forty feet per mile, and that no grade will be above 60 feet in a mile. These inclinations frequently continue for a considerable distance, though they are always relieved by moderate grades or levels, whenever either unfavorable curves or stopping places for the reception of fuel or water are required.

These grades will admit free passage to passenger trains, and the transportation of heavy burthen trains over the road will be effected by increasing the power on its greater inclinations.

On the celebrated rail-way from Liverpool to Manchester in England, grades exist similar to the greater inclinations here adopted, and it is well known that a single engine ascends these grades with the ordinary passenger trains, weighing from thirty-five to fifty tons gross, at a speed between ten and fifteen miles, and never less than seven miles per hour. By the aid of extra locomotive engines stationed on this road at the steeper grades to assist the heavy freight trains up the ascents, loads of two hundred and thirty tons gross are transported from Liverpool to Manchester at the average rate of twelve miles per hour; yet it is now well ascertained that these engines are less suitable for such grades than those manufactured in this state. Other rail-roads in England have since been constructed wtth similar grades, and the inclination has in this country been increased on important leading roads more than forty per cent. over the maximum grade here recommended.

The annexed estimate in detail of the line divided into sections of about a mile each, give a description of the nature of the work required to complete the road formation to the respective grades, so as to prepare them for the reception of the superstructure, consisting of a double track of rail-way. It will be proper here to discuss the style of executing the proposed work.

The formation of the road-way is to be twenty-four feet wide in the excavation, thereby permitting a space of two feet on each side of the rail-way to be occupied by drains to carry away the water that may fall upon the surface of the road; leaving a width of twenty feet for the foundation of the two tracks. The sides of the prism to be excavated are intended to have a slope of one to one, wherever the material is composed of earth, gravel or other crumbling substance.

Where solid rock or hard slate will be encountered the slopes are to be at the rate of one fourth to one.

The nature of the material to be excavated though varying considerably according to the extent that the line traverses, is of such a description that wherever deep cuttings occur, there will invariably be found solid rock after penetrating a few feet in depth. The steep slopes adopted in the rock cuttings will therefore diminish the cubic contents to be removed, and the great difficulty always attending deep cutting in wet or gravelly soils will not be encountered.

The embankments are intended to be twenty feet wide on top, with side sloping one and a half to one. A steeper slope may frequently be practicable, wherever the embankments are formed of rock from the excavations, thereby saving a considerable amount of material, but this has only been calculated upon in few instances where a certainty of the advantages existed.

Three descriptions of bridges are intended to be used; these are each equally suitable for its proper purpose, but greatly differing in cost. The cheapest kind of structure for this purpose, is composed of common string pieces, spanning not more than thirty-five feet between their supports.

The second kind have also these string pieces, but owing to the greater length of the span, extra support is given to them by braces and iron bolts, thereby enabling them to support equal weight at a span not exceeding fifty feet. The third and most expensive class are applied to the passage of rivers and deep ravines, where the piers would be high and expensive; these are to be constructed on the arch principle and will admit of spans of one hundred and seventy feet.

Wherever it is practicable, these will be constructed with a deck in place of a roof, and the track will then be on the top of the bridge, whereby a saving in the heighth of the piers will be attained.

Wherever smaller streams cross the direction of the line, or occasional depressions in the profile of the ground require an opening for draining the bed of the road and adjacent lands, it will be necessary to construct culverts or drains. The first of these are always arched and have one or more spans from four to twenty feet each; these must be built of good hammer dressed stone laid in lime mortar.

The drains on the contrary must be built of dry masonry, covered with strong flag stones, and present an opening of two feet square.

No viaducts of stone masonry are required, as the abundance of the best timber for bridges render them inexpedient owing to the great expense attending their construction.

The dimensions of the tunnels to be excavated on this line, are greater than has been adopted heretofore in the country, being twenty feet in width by twenty-two feet in height to the crown of the arch. It is thought that an increase of span will obviate any inconvenience to passengers arising from the consumption of vital air by the fires of the engines, or even from the smoke and steam generated by them while passing through the tunnel. At the same time it is to be observed, that the increase of the expense of excavating a tunnel of these dimensions, is not in a direct proportion with the cost of one of smaller calibre, as the most difficult part of the work in constructing them consists in the formation of the roof or arch, which is very nearly equally difficult in both.

The superstructure of the road involves a material item in the aggregate cost of the work. The magnitude of trade destined to pass over any line of rail-way connecting the western waters with the Atlantic, demands that the greatest attention should be paid to the formation of a permanent and smooth track, and as experience has proven the advantage possessed by ponderous engines over those formerly in use, the rails on which they are to move should possess a corresponding degree of strength for the efficient support of their weight. The usual method of attaining this object, has been by enlarging the dimensions of the iron rails, so as to enable them to sustain the additional burthen they are designed to bear. The T rail formerly preferred of a weight from thirty-five to forty pounds per yard, has therefore given place to the more substantial H rail, weighing from forty-five to sixty-five pounds per yard. These rails were almost uniformly supported at an interval, of about a yard in their lengths, as the increased weight intended to pass over there surface, demanded such a strength; but a cheaper and more effectual mode of attaining the same end, has lately been recommended, which, simply consists in giving support to a rail of moderate weight at shorter intervals. By this method, the track will acquire great security, from the more equal bearing on the surface of the road, which must render the necessity for repair less frequent. It has therefore been determined to recommend, that the superstructure of this road, should consist of a bed of broken stones, covering the entire graded surface of the road to the depth of four inches, being twenty feet wide on the bottom and nineteen on the top; upon this four longitudinal sills of locust timber, three inches thick by nine inches wide, are placed parallel to the centre line of the road, and at a proper distanee apart to conform with the double track of rail-way

Upon these undersills, a series of cross sills, also of locust timber, six inches square and seven feet long, should be arranged so that for each track, ten sills will occupy a length of eighteen feet of the line. This is effected by securing the first and last sill in the distance named, one foot from the adjoining sill, and the remainder at an interval of two feet between their respective centres.

Upon these cross sills, the H rail of a weight of forty-five pounds to the yard, in lengths of about eighteen feet, will be secured by having cast iron chairs countersunk into the sills supporting each end, and the middle of every bar or rail, so that three chairs will support each length of eighteen feet, and the surfaces of the intervening sills, will range flush with the top beds of the chairs. The rail will then be spiked down to each sill with two brad headed spikes, four and a half inches long.

The whole track should finally be filled up with gravel or small rubble stone, well packed to the level of the tops of the cross sills.
The following estimate will exhibit the cost of one mile of a single track of rail-way on the plan described.

29 33	cross sills 6 *by* 6 inches, 7 feet long at 40 cents,		$1,173 20
105 60	running feet of undersills 3 *by* 9 inches	4½	475 20
686.40	perches of broken stone for foundation	62½	429 00
10.42	" " rubble " " filling	25	260 50
140.80	spikes weighing 3520 lbs	9	316 80
11 72	cast iron chairs $10\frac{9}{10}$ lbs each	45	527 40
1172	screw bolts and rents	10	117 20
70.71	tons iron rails, delivered in Phila. at $60	00	4,242 60
	Hauling and distributing along the line		
70.71	tons iron rails		
5.70	" cast iron chains		
1.70	" spikes, screw bolts and rents		
78.11	" at $15		1,171 65
	Workmanship in completing track at $3,25 per rod		$1,040 00
			97 53 55

During the operations of grading the road, it is designed that wherever stone and gravel is obtained from the different excavations, a sufficient quantity of these materials shall be reserved for the formation of the superstructure. A further reduction is practicable in the formation of the second track, if that is delayed until the first is completed, which will facilitate the delivery of all the materials for it, so that the cost of this track is estimated at $9079 14, being a saving of $67 441 per mile.

It is thought that a delay of a full use of both tracks, during the period necessary for the construction of the second, will not involve any serious inconvenience or loss in trade, as the public will hardly be prepared for the efficient use of both tracks, until some time has elapsed after the communication is opened. The total cost of each mile of superstructure for a double track of rail-way is therefore estimated at $18,832 69.

During the operation of arranging the data of the survey into a proper system upon which to base the necessaay calculations for an estimate of its cost, two alterations of the line became expedient, they require to be explained here as they differ from the preliminary report already made.

One was deemed necessary where the line leaves Buffalo mountain, in order to attain the slope of the Dry Ridge, where a high bridge will be required over the valley of Buffalo creek, immediately after which a deep cut through a spur of "the Ridge" was contemplated. It was afterwards found expedient to reduce the height of the bridge so much that a tunnel had to be adopted where the deep cut originally was designed. There will therefore, be three tunnels on the line instead of two as stated in the former report; yet, it must be observed that it is probable that both this and the tunnel on the Allegheny mountain, may eventually be avoided by pursuing the opposite side of the valley of Deeter's run, as already suggested in the first report.

The other change is of a more favorable character, and relates to the length of the line. This, it will be observed is here stated to be two hundred and forty miles and forty-two chains, being two miles and thirty chains less than originally surveyed. This change was effected by adopting a better system of curvatures on the slopes of Laurel Hill, whereby also a less expensive line was obtained.

Having successfully established one line of continuous rail-road without inclined planes, conforming to the instructions directing the survey, an examination with a view of a M'Adamised turnpike in connexion with the rail-road became perhaps unnecessary ; but as the length of the former exceeds by about eighty-five miles the length of the presnt turnpike, it may perhaps be interesting to investigate whether it would be advantageous in part to avoid so great an increase of distance by adopting a different kind or improvement.—As no survey was made with this view, the want of necessary data for such an investigation renders it limited. The turnpike now in use it is known possesses inclination of five degrees, and imperfect as its location, formation and present repair is, it could not fairly be brought into a calculation of this kind. A general comparison of the two species of improvement can therefore only be attempted.

The track of a rail-way presents, perhaps, the nearest attainable perfection of a road suitable for the locomotion of bodies ; a smooth, hard, and nearly level surface, on which any given power must have the greatest practical effect where the load is divested nearly of all friction. Setting aside the force necessary to overcome the resistance of friction, all roads of equal inclination would require the same power to propel a load up an ascent, as it is well known the gravity, or the tendency of the load to descend the plane, would alone have to be counteracted. This power is in all cases equal to the height of the plane divided by its length—so, for instance, if a ton gross or 2240 pounds is intended to be propelled up an ascent rising one foot perpendicular in a horizontal distance of 100 feet, the tendency of this load to descend would be one hundredth part of a ton, or 22 40-100 pounds, if it was independent of the resistance of friction This resistance being, however, constant or unchanged in regard to any degree of inclination, it is only necessary to ascertain its magnitude in proportion to the load on different kinds of roadway, to enable a calculation of the whole resistance required to be overcome on any given inclination. This has fortunately been accomplished by a number of carefully conducted experiments on the best roads in England, where the force of traction necessary to draw one ton gross on a level was found as follows:

On a well made pavement,	33 lbs.
On a broken stone surface on flint road,	65 "
On a gravel road,	147 "
On broken stone upon rough pavement foundation,	46 "

On a broken stone surface, upon bottoming of concrete, formed of Parker's cement and gravel,	46 "
Mean traction of one ton,	67 lbs.

These experiments were conducted by Mr. Telford, on the Holyhead road, and as the known resistance of friction on a rail-road is but eight pounds per ton on a level, it follows that the mean resistance on the above roads exceeds it more than eight times. Mr. Thredgold, who also investigated this subject, states that "one horse on a rail-road will produce as much as eight on a turnpike"—consequently the power of one horse will draw a load eight times as far on a rail-road as on a good turnpike, if the inclinations are equal; and assuming the present turnpike between Chambersburg and Pittsburg to be one hundred and fifty-five miles long, the power exerted by a horse on this road would be equal to drawing the same load on a rail-road of similar grades, a distance of twelve hundred and forty miles. In respect to the cost of transportation, there appears, therefore, no possibility of a preference being given to a turnpike as a substitute for a rail-road, and more than sixty years experience has demonstrated the advantage of constructing these roads for horses.

But the great advantage which rail-roads possess over the other modes of transportation was never fully developed until locomotive engines, by successive improvements, attained their present power and speed, which enables them to drag vast burthens an almost unlimited distance, at a constant and rapid pace, greatly exceeding what could be attained by animal power; and it is this advantage that has justified the investment of so much capital in this species of improvement.

It has already been stated that the length of the main line of the present survey is 240 miles and 42 chains. A line was originally run in a more direct course between Chambersburg and the Cove mountain, three and a half miles shorter than the distance now computed, but the great expense of constructing it, and the steep grades that inevitably would be incurred, caused this route to be abadonned for a more circuitous one. The present route is therefore located on the line of the Franklin rail-road, now completed, which it occupies for five miles and sixty-two chains; a saving in construction is therefore attained over the original survey of two miles and twenty-two chains. In consequence of this arrangement, the annexed detailed estimate of the cost of grading the road begins with a portion of the uncompleted sixth mile from Chambersburg, and the sections continue after that to indicate the distance from this town, terminating at Pittsburg by the shortest route surveyed, so that this estimate includes a distance of 234 miles and 60 chains requiring to be constructed, the cost of which will be as follows:

For graduation of road, including three tunnels, eighty-two culverts, seventy-eight bridges, and two hundred and one drains,	$6,524,415 91

Superstructure for a double track of H rail, weighing 45lbs. per yard, on locust sills and broken stone, at $18,832 69 per mile,	4,420,973 98
For turn-outs, water stations, depots, engine houses, and collectors offices,	90,400 00
For land damages and contingencies.	270,000 00
	$11,305,789 89

Should it be deemed expedient to make an independent road parallel to the Franklin rail-road, in order to possess an entire line between Chambersburg and Pittsburg, an additional sum must be allowed for the grading.

ed for the grading.	$34.087 74
For a double track of rail-way superstructure,	104,050 51
	$138,138 25

Which added to the above will make an entire sum to be provided for the completion of this work, of $11,443,928 14.

On examining the estimate it should however be recollected that but a single line of road has been examined, and that even if the general features of this route were adhered to, there is every probability that by minor deviations from its location in different places, a more eligible and cheap line might be attained. The sum estimated is considered full and liberal in every respect, so as to secure the perfect workmanship which the magnitude of the destined trade demands; and any deviation from the line examined, it is thought, can only operate favorably towards reducing the eventual cost of the work.

Finally, as regards the Sewickly route, which leaves the shorter route near Youngstown and rejoins it near the mouth of Turtle creek, as explained in the former report. The most favourable line runs in this direction was the shorter of the two named; one being twenty miles and seventy three chains, and the other sixteen miles and twenty chains longer than the Brush creek route.

By the Brush creek route the cost of grading the distance between the points of departure and junction of the latter route will be		$1,212,761 58
The Sewickly route will cost,	$692,094 10	
And the additional cost of 16¼ miles of superstructure for this route would be,	306,031 21	998,125 31

Making a difference in favour of the Sewickly route of, $214,636 27 And therefore reducing the aggregate cost of the whole line if this route were to be adopted to the sum of $11,091,153 62; but increasing the distance so as to render it 257 miles, and adding about one hour to the time required to travel this road.

SLACKWATER NAVIGATION ON THE RAYSTOWN BRANCH OF THE JUNIATA RIVER.

This branch of the Juniata river occupies the valley between the Broad Top, and Terrace Mountains on one side, and Allegrippus Ridge on the other. From these leading ridges, minor hills jut into the valley, and compel this stream to assume a remarkably, devious and serpentine course. The declivities of these hills are generally gentle, gradually sloping down to the margin of the river, leaving but little flat land along its banks; the force of the stream has however, in many places encroached on them, so as to interrupt the regularity of their slopes, and by having worn away their bases, caused them to present abrupt bluffs, alternating on either side of the river, as the turnings in the stream, force the current to wash the respective shores.

From this difficiency of extensive flat land, it may be inferred, that if either a slackwater navigation, a canal or a rail-way was to be adopted, the lines of location for each would be contiguous, and though their respective cost might vary, their lengths would be nearly the same.

As either of these modes of improvement was authorized, a correct survey of each would perhaps, best enable a proper comparison to be made, but sufficient to determine the choice consisted in adopting the most economical mode of improvement in point of construction. The foregoing estimate for the rail-road will illustrate, that the superstructure alone of a double track, would exceed the cost of an equal distance of slackwater navigation. If it is on the other hand considered, that in constructing a canal, the formation of its bed and banks, the necessary aqueducts, culverts, farm bridges, waste weirs &c., would have to be constructed, neither of which are required on a slackwater navination, it will appear that in this instance also the mode of improvement re-commended, will involve the least expense.

The plans designated for the work on this improvement, are of the most substantial character, particularly as regards the mechanical work, the aim has been invariably to form plain and permanent structures, suitable to the purpose of the proposed trade.

The manner of constructing the locks adjacent to the dams, differ in some respects from the plan usually adopted, as a lift has been combined with the necessary guard lock. This has been effected by constructing a lift-lock in the usual manner; the coping will however be four feet above the water line or comb of the adjacent dam, thereby, rendering the navigation practicable during a freshet in the river, which does not exceed that height. At the head of the lock, an additional gate is designed to be inserted above the recess of the ordinary upper gate, whereby the whole length of the lock will be about fifteen feet greater than usual. This grade gate will stand on the breast or lift of the lock, and being intended to remain closed during great floods, it will correspond in height with the greatest rise to be anticipated. By this means it is obvious that the necessity of constructing a guard lock independent of a lift lock is obviated, though the navigation will be suspended during the period a freshet exceeds four feet in height. It is not apprehended that great inconvenience will arise from this interruption, as the duration of such floods will be but short and the navigation during that stage of the water will be hazardous on account of the velocity of the current. Another advantage to be attained consists in locating the guard-lock contiguous to the respective dam, and by making the walls somewhat more massive than in ordinary cases, the construction of one abutment to the dam will be avoided.

The abundance of water always at command on this stream will admit of constructing the locks with considerable lifts, (in two instances sixteen feet lift has been introduced) and thus a saving in the cost of construction, as well as in the time of passage for boats will be produced.

The locks should however be constructed with great care and in the most durable manner, as any repairs on works so situated are always attended with difficulty; cut stone locks are therefore strongly recommended, and abundance of good sand-stone, suitable for this kind of work is found in the vicinity of the line.

The dams are intended to be constructed in the most substantial manner on the plan lately adopted on the Pennsylvania Improvements. The great destruction of those originally built upon the state works, demanded a stronger and much more expensive mode of construction; these have since been fully tested, and great confidence in their permanency has been established. A question relating to the proper heights of dams arises, however; whether less altitudes than those generally adopted on this branch, should not have been preferred, and if a comparison is made it will appear that their cost on the plan here adopted, is not in a direct proportion with their respective heights, but that one of great elevation will be more expensive than two dams of half that altitude.

On the other hand, if their heights should be reduced, the advantage of large lifts in the locks would be lost, and the number as well as the cost of them would be increased. Any subsequent modification in this respect will be favored by the frequency of suitable sites for their location.

The towing path along the pools of the different dams is designed to be made at least ten, and not exceeding fifteen feet above the ordinary surface of the water, so as to be passable at all times when the navigation is practicable. The slopes of its sides will be at an angle usually given to these embankments, and the material for its construction will generally be found so convenient that no carts will be required for its transportation. This work will, therefore, be much cheaper than is heretofore estimated for embankments, and it is very often the case that where the towing path will be most exposed to abrasion by the current of the river, the material for its construction is most suitable to resist this tendency by being composed of loose stone and coarse material from the adjoining bluff.

The bridges, culverts, and drains, are similar to those described for the rail-road, they correspond of course with the dimensions of the towing path, in place of the width of that road. At the crossing of the Juniata river, in order to connect this navigation with the Pennsylvania works, a bridge of dimensions sufficient for accommodating general travel, has been estimated: two other bridges over the Raystown branch near Clinton Iron works will admit of single teams passing.

The subjoined estimate in detail for each section of about a mile in length, exhibits the items and cost of the different species of work to be done on the fifty-four miles and fifteen chains, constituting the entire length of this work, the aggregate of which amounts to $710.643 92. Should a cheaper mode of construction be preferred by substituting locks built of wood, combined with rubble masonry, in place of the mode recommended, the total cost of this improvement will not exceed $588,628 92. Access to the entire coal region of the Broad Top Mountain would thereby be accomplished so far as this stream washes its base.

It might however be expedient for the present, only to extend this work as far as Stonerstown, situated in Bedford county, near the line dividing it from Huntingdon county; in which case, the improvement would embrace fourty-four miles, nineteen of which would join the coal region, and the cost of constructing it on the plan recommended would be $574 620 90.

All of which is respectfully submitted.
HOTHER HAGE,
Civil Engineer.

CHAMBERSBURG, JANUARY 22, 1839.

GRADE TABLE,

Commencing at the junction of the Franklin, with the Cumberland Valley Rail-road at Chambersburg.

Distance in chains.	Grade per mile.	Ascent.	Descent.	Elevation of Grade	Termination of Grade,			
Chs. Lks.	Feet.	Feet.	Feet.	Feet.		Miles,	Chs.	Lks.
15.17	0.00	0.00	0.00	5.298a			15	17
24.12	27.98	8.45		13.751a			39	29
42.22	21.12		11.146	2.605a		1	01	51
30.30	27.98	10.58		13.200a		1	31	81
53.03	25.34		16,79	3.660b		2	04	84
51.52				3.660b		2	56	34
25.76	31.68	10,20		6.541a		3	02	12
36.37				6.541a		3	38	49
57.58	21.12	15.20		21.738a		4	16	07
37.88				21.738a		4	53	96
46.97	26.92		15.805	5.933a		5	20	93
33.47	36.02	15.07		21.000a	Junction with Franklin rail-road.	5	54	40
161.60	51.484		104.00	83.00 b		7	56	00
156.00	16.40		32.00	115.00 b	East Conococheague half a mile back.	9	52	00
6.00				115.00 b		9	58	00
156.00	8.20		16.00	131.00 b		11	54	00
78.00	6.00	6.00		125.00 b	Back creek.	12	52	00
90.60	24.88	28.00		97.00 b		13	62	00
84.00	36.16	38.00		59.00 b		14	66	00
108.00	17.766	24.00		35.00 b		16	14	00

114.00	2.80		4.00	39.00b	West Conococheague crossed,	17	48	00
144.00	38.88	70.00		31.00a		19	32	00
40.29	39.76		20.00	11.00a		19	72	29
96.00	55.00	66.00		77.00a		21	08	29
8.00	20.00	2.00		79.00a		21	16	29
676·00	55.00	465.00		544.00a		29	52	29
18.00	26.66	6.00		550.00a	Summit of Cowen's gap,	29	70	29
320.00	55.00		220.00	330.00a		33	70	29
120.00	44.00		66.00	264.00a	Burnt Cabins,	35	30	29
100.00	33.60		42.00	222.00a		36	50	29
120.00	18.80		24.00	198.00a		37	72	29
158.00	16.28		32.00	166.00a		39	70	29
180.00	11.55		26.00	140.00a		42	10	29
80.00	10.00		10.00	130.00a		43	10	29
160.00	15.00		30.00	100.00a		45	10	29
160.00	5 00	10.00		110.00a		47	10	29
160.00	8.00	16.00		126.00a		49	10	29
80.00	10.00	10.00		136.00a		50	10	29
160.00	20.00	40.00		176.00a		52	10	29
40.00				176.00a		52	50	29
80.00	28.00	28.00		204.00a		53	50	29
40.00				204.00a		54	10	29
80.00	16.00	16.00		220.00a		55	10	29
160.00	27.00	54.00		274.00a	Western end of Sideling hill gap.	57	10	29
100.00	50.00	62.00		336.00a	Well's Valley.	58	30	29
240.00	60.00	180.00		516.00a		61	30	29
8.00	10.13		1.50	515.00a		61	38	29
311.00	60.00	235.00		750.00a	Eastern end of tunnel.	65	29	65

TABLE.—CONTINUED.

Distance in Chains.	Grade per mile.	Ascent.	Descent.	Elevation of Grade.	Termination of Grade			
Chs. Lks.	Feet.	Feet.	Feet.	Feet.		Miles.	Chs.	Lks.
38.00				750.00a	Ground Hog Valley,	65	67	65
552.00	60.00		414.00	336.00a	Raystown Branch, half a mile back	72	59	65
28.00				336.00a	On Piper's run,	73	07	65
170.00	50.00	106.25		442.25a		75	17	65
220.00	60.00	165.00		607.25a		77	77	65
11.00	18.20	2.75		610.00a		78	08	65
130.00				610.00a	Wood-cock summit,	79	58	65
300.00	50.00		187.50	422.50a		83	38	65
80.00	12.00		12.00	410.50a		84	38	65
80.00	9.50	9.50		420.00a		85	38	65
80.00	10.00	10.00		430.00a		86	38	65
100.00				430.00a		87	58	65
120.00	14.00	21.00		451.00a		89	18	65
61.35				451.00a	The town of Bedford,	90	00	00
352.00	10.91	48.00		499.00a		94	32	00
240.00	29.25	87.75		586.75a		97	32	00
320.00	31.56	126.20		712.99a		101	32	00
80.00	50.00	50.00		762.99a		102	32	00
226.00	55.00	155.37		918.36a		105	18	00
20.00	13.50	3.37		921.73a		105	38	00
214.00	55.00	147.125		1068.86a		108	12	00

160.00	57.50	115.00		1183.86a	110	12	00
8.00				1183.86a	110	20	00
976.00	55.00	671.00		1854.86a	122	36	00
80.00				1854.86a	123	36	00
140.00	20.00		35.00	1819.86a	125	16	00
80.00	40.00		30.00	1789.86a	126	16	00
160.00	10.50		21.00	1768.86a	128	16	00
80 00	50.00		50.00	1718.86a	129	16	00
96.00	16.00		19.20	1699.66a	130	32	00
104.00	26.00	33.80		1733.46a	131	56	00
52.00	10.00		6.50	1726.96a	132	28	00
268.00	50.00	167.50		1894.46a	135	56	00
20.00	26.00	6.50		1900.96a	135	76	00
36.00				1900.96a	136	32	00
52.00	50.00	32.20		1933.46a	137	04	00
32.00				1933.46a	137	36	00
24.00	15.00		4.50	1928.96a	137	60	00
56 00				1928.96a	138	36	00
60.00	50.00		37.50	1890.46a	139	16	00
320.00	60.00		240.00	1650.46a	143	16	00
80.00	20.00		20.00	1630.46a	144	16	00
40.00				1630.46a	144	56	00
40.00	50.00	25.00		1655.46a	145	16	00
54.00	60.00	40.70		1696.16a	145	70	00
12.00				1696.16a	146	02	00
112.00	60.00		84.00	1612.16a	147	34	00
42.00				1612.16a	147	76	00
100.00	36.80	46.00		1658.16a	149	16	00

TABLE.—CONTINUED.

Distance in Chains.	Grade per mile.	Ascent.	Descent	Elevation of Grade.	Termination of Grade.		
Chs. Lks.	Feet.	Feet.	Feet.	Feet.	Miles.	Chs.	Lks
40.00	20.00		10.00	1648.16a	149	56	00
120.00	60.00		90.00	1558.16a	151	16	00
40.00				1558.16a	151	56	00
128 00	35.00	56.00		1614.16a	153	24	00
120.00	48.57	72.38		1681.54a	154	64	00
80.00	50.00	50.00		1736.54a	155	64	00
232.00	55.00	159.50		1896 04a	158	56	00
232.00	50.00	145.50		2049.04a	161	48	00
24.00	20.00	6.00		2047.04a	161	72	00
8.00				2047.04a	162	00	00
4.00	20.00		1.00	2046.04a	162	04	00
456.00	50.00		285.00	1761.04a	167	60	00
36.00				1761.04a	168	16	00
200.00	55.00		137.50	1623.54a	170	56	00
28.00	20.00		7.00	1616.54a	171	04	00
160.00	60.00		120.00	1496.54a	173	04	00
28.00	20.00		7.00	1489.54a	173	28	00
164.00	60.00		123.00	1366.54a	175	36	00
24.00	30.00		9.00	1357.54a	175	60	00
48.00	55.00		33.00	1324.54a	176	28	00
28.00	30.55		10.50	1324.54a	165	28	00

448.00	55.00		308.00	1006.04a	182	24	00
80.00	60.00		60.00	946.04a	183	24	00
80.00	55.00		55.00	891.04a	184	24	00
72.00	60.00		54.00	837.04a	185	16	00
92.00	46.00		52.90	784.14a	186	28	00
232.00	60.00		174.00	610.14a	189	20	00
8.00				610.14a	189	28	00
132.00	40.00		66.00	544.14a	191	00	00
40.00	34.00		17.00	527.14a	191	40	00
40.00	10.20		5.10	522.04a	192	00	00
52.00	6.00		3 .90	518.14a	192	52	00
56.00	26.00	18.20		536.34a	193	28	00
80.00	24.00		24.00	512.34a	194	28	00
52.00	17.00		11.05	501.29a	195	00	00
176.00	31.00		68.20	433.09a	197	16	00
144.00	17.00		30.60	402.49a	199	00	00
40.00				402.49a	199	40	00
80.00	12.00		12.00	390.49a	200	40	00
364.00	48.20	219.31		609.80a	205	04	00
8.00				609.80a	205	12	00
76.00	40.00		38.00	571.80a	206	08	00
72.00	20.84		18.756	553.044a	207	00	00
160.00	50.00		100.00	455.014a	209	00	00
60.00	12.00		9.00	444.044a	209	60	00
100.00	48.00	60.00		504.044a	211	00	00
76.00	50.00	47.50		551.544a	211	76	00
8.00				551.544a	212	04	00
236.00	50.00		147.50	404.044a	215	00	00

TABLE.—CONTINUED.

Distance in Chains	Grade per mile.	Ascent.	Descent.	Elevation of Grade.	Termination of Grade.		
Chs. Lks.	Feet.	Feet.	Feet.	Feet.	Miles.	Chs.	Lks.
76.00	40.00		38.00	366.044a	215	76	00
8.00				366.044a	216	04	00
52.00	27.00	17.55		383.594a	216	56	00
8.50				383.594a	216	64	00
76.00	44.00		41.80	341.794a	217	60	00
100.00	37.00		46.25	295.544a	219	00	00
100.00	8.00	10.00		305.544a	220	20	00
80.00	50.00		50.00	255.544a	221	20	00
80.00	30.00		30.00	225.544a	222	20	00
80.00	10.00	10.00		235.544a	223	20	60
160.00	40.00		80.00	155.544a	225	20	00
140.00	11.00		19.15	136.294a	227	00	00
60.00				136.294a	227	60	00
60.00	28.06		21.00	115.294a	228	40	00
40.00				115.294a	229	00	00
160.00	16.00	32.00		147.294a	231	00	00
120.00	10.00		15.00	132.294a	232	40	00
40.00	20.00		10.00	122.294a	233	00	00
40.00				122.294a	233	40	00
40.00	20.00		10.00	112.294a	234	00	00
24.00	10.00	3.00		115.294a	234	24	00

	56.00				115.294a			235	00	00
[illegible]	60.00	8.00	6.00		121.294a			235	00	00
[illegible]	80.00	40.00	40.00		161.294a			236	60	00
[illegible]	60.00				161.294a			237	40	00
[illegible]	60.00	35.00		26.25	135.044a			238	20	00
	60.00	10.00		7.50	127.544a			239	00	00
2640	40.00				127.544a			239	40	00
[illegible]	48.00	25.00	15.00		142.544a			240	08	00
2244	34.00	12.00		5.10	137.444a	Pittsburg,	[illegible]	240	42	00

[illegible] 24.

DESCRIPTION AND ESTIMATE OF THE CHAMBERSBURG AND PITTSBURG RAIL-ROAD, LEAVING THE FRANKLIN RAIL-ROAD NEAR MARION.

SECTION No. 6.

The excavation of this section will be very easy, and furnish sufficient material for the small amount of embankment required. This section, commences at the Franklin rail-road already graded, and completes the sixth mile from the junction of this road, with the Cumberland valley rail-road at Chambersburg. Only eighteen chains require grading and descend at the rate of 51.36 feet per mile. The curvature is abrupt.

1023	cubic yards of common excavation at	9cts	$92 07
424	" " " embankment	" "	38 16
			$130 23

SECTION No. 7.

The first half mile of this section will be light embankment, the whole of which will be furnished by the excavation of the remaining part. The grade on this section continues to descend at the rate of 51.36 feet per mile. A few chains of grubbing, and one square drain are required.

	Grubbing.		$ 48 00
46719	cubic yards of common excavation at	9cts.	4,204 71
10170	" " rock	" 50	5,085 00
10000	" " embankment	" 9	900 00
	Drain No. 1. 22 perches at	$1 50	33 00
			$10,270 71

SECTION No. 8.

The first quarter mile of this section is excavation, the greater part of which is easy, the remainder of the section will consist of embankment, the most expensive of which will be twenty-four feet high. The greater part of it will require grubbing. The curvature is light, and two drains will be required.

	Grubbing		$144 00
15454	cubic yards of common excavation at	9 cts.	1,390 86
4063	" " rock	" 50	2,031 50
94948	" " embankment	" 16	15,191 68
	Drain No. 2. 34 perches at	$1 50	51 00
	" " 3. 26 " "	"	39 00
			$18,848 04

SECTION No. 9.

There is but little difference between the amounts of excavation and embankment. The excavation with but a small exception is easy.

One drain and one culvert of four feet span will be required. The grade on this section, and a part of the preceding one, descends at the rate of 15.86 feet per mile. The curvature is easy.

20606	cubic yards of common excavation at	9cts.	$1,854 54
3051	" rock " "	50	1,525 50
33278	" embankment "	12	3,993 36
	Drain No. 4. 16 perches at	$1 50	24 00
	Culvert " 1. 83 " "	$2 90	240 70
			$7,638 10

SECTION NO. 10.

The first one fourth mile of this section consists of embankment, it will be furnished by the excavation which forms the remainder of the section. The excavation consists principally of earth.

One bridge one hundred feet long, over East Conococheague creek, and drain No. 5. will be required.

The greater portion of the grade of this section, will descend at a rate similar to that of the preceding section, and the remaining portion at the rate of seven feet per mile. The curvature is abrupt, but in no place is the radius less than the limit of one thousand feet.

18338	cubic yards of common excavation at	9cts.	$1,650 42
953	" " rock "	50	476 50
9775	" " embankment "	10	977 50
	Drain No. 5. 18 perches at	$1 50	27 00
	Bridge No. 1.		3,150 00
			$6,281 43

SECTION NO. 11.

The embankment and excavation of this section, are very equally distributed. The excavation comprises but little rock. There will be a few stations of grubbing, and the grade descends at the rate of seven feet per mile, drains No. 6 and 7 will be required. The curvature is light.

	Grubbing		$ 108 00
15368	cubic yards of common excavation at	9cts	1,383 12
3267	" " rock "	50	1,633 50
13366	" " embankment "	10	1,336 60
	Drain No. 6. 14 perches at	$1 50	21 00
	" " 7. 14 " "	"	21 00
			$4,503 22

SECTION NO. 12.

On this section the embankment preponderates. The road will be made along East Conococheague creek, on a hill side. What little excavation occurs will be easy. There will be grubbing on the greater part of it, drains No. 8 and 9 will be required. The grade on the first part descends at the rate of seven feet per mile, and that on the other part ascends at the rate of six feet per mile. The curvature is easy.

Grubbing.	$192 00
1190 cubic yards of ex. at 9 cents,	107 10
19179 " " of embankment at 12 cts.	2301 48
Drains No. 8, 12 perches at $1 50	18 00
" " 9, 13 " " do.	19 50
	$2638 08

Section No. 13.

The embankment on this section will exceed the excavation by a large amount but will not be expensive. The excavation will be found easy. But a few chains of grubbing are necessary. The line crosses over a point made by the junction of Back creek with the East Conococheague creek, and crossing the former continues up it. Drain No. 10 and a bridge 60 feet long over Back creek will be required. The greater part of the grade is similar to that of the adjoining portion of the preceding section; the remainder ascends at the rate of 24.88 feet per mile. The curvature is abrupt at one point.

Grubbing,	$36 00
10278 cubic yds. of common excavation at 9 cts.	925 02
30974 " " embankment at 12 cts.	3716 88
Drains No. 10, 19 perches at $1 50	28 50
Bridge No. 2,	3015 00
	$7721 40

Section No. 14.

The line turns up a draught at right angles to Back creek and pursues a course leading to West Conbcocheague creek. The ground passed over is rough and rock excavation occurs. The embankment which preponderates will be afforded by the adjoining grounds. A few chains of grubbing will be required. The grade on the last fourth mile of this section ascends at the rate of 36.16 per mile. The curvature is abrupt.

Grubbing,	$18 00
14204 cubic yds. of common excavation at 9 cts.	1278 36
3702 " " rock at 50 cents,	1851 00
52534 " " embankment at 12 cents,	6304 08
Culvert No. 2, 87 perches at $2 90	252 30
Drain " 11, 18 " 1 50	27 00
	$9730 74

Section No. 15.

The excavation and embankment on this section are very nearly equal. But little rock will occur in the excavation; continuing the same direction the line passes Mr. Keefer's at its commencement. A few chains of grubbing will be required. Drain No. 12 will be necessary. The grade continues similar to that of the preceding section, until the last fourth of it when it ascends at the rate of 17.76 feet per mile. The curvature for the next 4 miles is easy.

	Grubbing,	$54 00
13225	cubic yards of common excavation at 9 cts.	1190 25
801	" " rock at 50 cts.	400 50
13539	" " embankment at 10 cts.	1353 90
	Drain No. 12, 14 perches at $1 50	21 00
		$3019 65

Section No. 16.

The embankment exceeds the excavation and can be easily obtained. The grubbing continues throughout the section and is alternately light and heavy. The grade is similar to that of the latter part of the preceding section. Drain No. 13 will be required.

	Grubbing,	$171 00
2761	cubic yards of common excavation at 9 cts.	248 49
29932	" " embankment at 14 cts.	4190 48
	Drain No. 13, 22 perches at $1 50	33 00
		$4642 97

Section No. 17.

The excavation in this section which preponderates contains some rock but is principally easy. There occurs some 4 or 5 stations of light grubbing. The grade of the greater part of this section is similar to that of the preceding one, but that of the latter portion of it descends at the rate of 2.80 feet per mile.

	Grubbing,	$60 00
27233	cubic yards of common excavation at 10 cents,	2723 30
7029	" " rock at 50 cents,	3514 50
7642	" " embankment at 10 cents,	764 20
		7062 00

Section No. 18.

This section is composed almost entirely of embankment. It crosses the west Conocoeheague creek where a bridge 150 feet long will be required, and pursues a course toward the Cove mountain. What little excavation occurs contains some rock. Much of the embankment required on the western end will be supplied by the next section West. The grade of the eastern half is similar to that of the adjoining part of the preceding section; that of the western ascends at the rate of 33.28 feet per mile.

5153 cubic yards of common excavation at 9 cents,	$463 77
5000 " " rock at 50 cts.	2500 50
102843 " " embankment at 18 cts.	18511 74
Bridge No. 3, 150 feet in length,	6475 00
	$27950 51

Section No. 19.

The excavation of this section exceeds the embankment, and a large quantity of it will be rock. There will occur a few stations of grubbing. The grade continues to ascend at the rate of 33,280 feet per mile. Drain No. 14 will be necessary.

Grubbing,	$54 00
27981 cubic yards of common excavation at 12 cents,	3357 72
35000 " " " rock " 60 "	21000 00
21805 " " " embankment " 14 cts.	3052 70
Drain No. 14, 30 perches " $1 50	45 00
	$27509 42

Section No. 20.

The first half mile of this section is deep cutting, the deepest of which is 45 feet. There will be a large quantity of rock excavation. The latter part consists principally of embankments. The grade for the first half mile resembles that of the preceeding section, but for the remainder it descends at the rate of 40 feet per mile—1000 cubic yards of excavation will be required where Mercersburg road is crossed.

95073 cubic yards of common excavation, at 14 cts.	$13310 22
53564 " " " rock " 70 cts.	37495 80
19746 " " " embankment 10 cts.	1974 60
	$52779 62

Section No. 21.

This section consists almost entirely of embankment, a great part of which can be obtained from the excavation of the preceeding section, and the remainder immediately adjoining. The deepest filling is 34 feet. A small quantity of easy excavation occurs on its western end. A few chains of grubbing will be necessary. Drain No. 15 will be required. The grade ascends at the rate of 55 feet per mile, the line still approaching the mountain. The curvature is abrupt.

Grubbing,	$20 00
5929 cubic yards of common excavation at 9 cts.	533 61
167122 " " " embankment at 20 cts.	33424 40
Drain No. 15, 38 perches, $1 50	57 00
	$34035 01

Section No. 22.

During this section the line turns and runs almost parallel with the mountain towards Cowan's gap. The excavation exceeds the embankment, and is generally easy. Grubbing will be required on about half of the section. The grade is similar to that of the preceeding section, except for about 8 chains, which space being intended for a water station ascends at the rate of 20 feet per mile. The curvature is abrupt.

Grubbing,	$114 00
27599 cubic yards of common excavation at 10 cts.	2759 90
4122 “ “ “ rock 50 at cts.	2061 00
8765 “ “ “ embankment at 10 cts.	876 50
Drain No. 16, 17 perches at $1,50	25 50
“ “ 17, 17 “ “ “	25 50
	$5862 40

SECTION No. 23.

The line continues parallel to the mountain. The excavation and embankment are nearly equal, and the former with a small exception will be earth. Grubbing will be necessary throughout. The grade ascends at the rate of 55 feet per mile. Drains No. 18, 19, and 20, and culvert No. 3 will be required.

Grubbing	$216 00
44439 cubic yards of common excavation at 12 cts.	5332 68
5332 “ “ “ rock “ 50 cts.	2666 00
51258 “ “ “ embankment at 14 cts.	7176 12
Drain No. 18, 12 perches at $1,50	18 00
“ “ 19 28 “ “ “	42 00
“ “ 20, 26 “ “ “	39 00
Culvert No. 3, 4 feet span, 90 perches at $2,90,	261 00
	$15750 80

SECTION No. 24.

This section consists principally of excavation, a small portion of which is solid rock. The grubbing is alternately light and heavy throughout the greater part of it. The grade continues to ascend at the same rate. Drains No. 21 and 22, and culvert No. 4, 6 feet span will be required. The curvature is easy.

Grubbing,	$160 00
68405 cubic yards of common excavation at 12 cts.	8208 60
7280 “ “ “ rock at 50 cts.	3640 00
10205 “ “ “ embankment at 10 cts	1020 50
Drain No. 21, 11 perches at $1,50	16 50
“ “ 22, 10 perches at $1,50	15 00
Culvert No. 4, 186 perches at $3	558 00
	$13618 60

SECTION No. 25

Still approaching Cowan's gap by the mountain side with an ascending grade of 55 feet per mile, both deep cutting and heavy filling occur, but the excavation preponderates. The grubbing continues light throughout the section culverts No. 5 and 6, the former of 4 feet, and the latter of 6 feet span will be required.

Grubbing		$160 00
79760 cubic yards of common excavation at	13 cents,	10368 80
12300 “ “ rock at	50	6150 00
76121 “ “ embankment at	14	10656 94
Culvert No. 5, 59 perches at $2 90		171 10
“ 6, 244 “ 3 00		732 00
		$28238 84

SECTION No. 26.

The direction and situation of the line being similar to those of the preceding section, the deepest cutting is 42 feet, and the highest embankment 29 feet. The excavation exceeds the embankment, and is about one-seventh rock. The grubbing is light and continues throughout. The grade still ascends 55 feet per mile, and drain No. 23 will be required.

Grubbing		$168 00
73456 cubic yards of common excavation at	12 cts.	8814 72
11501 “ “ rock at	50	5750 50
55271 “ “ embankment at	12	6632 52
Drain No. 23, 36 perches at $1. 50		54 00
		$21419 74

SECTION No. 27.

The excavation of this section exceeds the embankment and contains a small amount of rock. The line still continues on the side of Cove mountain and ascends at the rate of 55 feet per mile. The grubbing is light throughout the section. Culverts No. 7, 8 & 9—Nos. 7 and 9 of 4 feet, and No. 8 of 6 feet span will be required. The curvature continues easy.

Grubbing		$130 00
79106 cubic yards of common excavation at	12 cents	9492 72
5101 “ “ rock at	50	2550 50
69458 “ “ embankment at	12	8334 96
Culvert No. 7, 100 perches at $3 00		300 00
“ “ 8, 271 “ “		813 00
“ “ 9, 59 “ “		177 00
		$21798 18

SECTION No. 28.

The situation and grade of this section are similar to those of the preceding one. It contains a large quantity of excavation, and the cutting of one-fourth of it is deep, the greatest being 68 feet. A large quantity of rock occurs in the excavation. The grubbing is light throughout. Culverts No. 10 and 15 each of 4 feet span will be necessary. The curvature continues easy.

	Grubbing		$144 00
74069	cubic yards of common excavation at	12 cents,	8888 28
37202	" " rock at	60	22321 20
33726	" " embankment at	10	3372 60
	Culvert No. 10, 64 perches at $3 00		192 00
	" " 11, 87 " "		261 00
			$35179 08

Section No. 29.

Three-fourths of this section consists of embankment; the remaining fourth is an exceedingly deep cut through a ridge of the mountain, the cutting at its summit being 86 feet. The greatest filling is 49 feet. The grubbing throughout the section is light. The same grade continues, and drains No. 24, 25 and 26, and culverts No. 12 and 13, each of 4 feet span, will be required. The curvature is easy.

	Grubbing		$160 00
16502	cubic yards of common excavation at	12 cents	1980 24
35601	" " rock at	60	21360 60
215422	" " embankment at	20	43084 40
	Drain No. 24, 27 perches at $1 50		40 50
	" " 25, 55 " "		82 50
	" " 26, 63 " "		94 50
	Culv't " 12, 86 " $3 00		258 00
	" " 13, 123 " "		369 00
			$67429 74

Section No. 30.

This section crossing Cowan's Gap reaches Little Aughwick creek and follows it down. It consists almost entirely of excavation a large amount of which is rock. The deepest cutting is 76 feet. Grubbing will be necessary on one half of this section. Culvert No. 14 of 4 feet span will be required. The grade for the first half mile is similar to that of the preceding section; it then ascends at the rate of 24 feet per mile for ¼ of a mile, and then descends at the rate of 55 feet per mile for the remaining distance. The curvature continues easy.

	Grubbing		$156 00
175345	cubic yards of common excavation at	15 cents,	26301 75
85768	" " rock at	80	68614 40
14129	" " embankment at	10	1412 90
	Culvert No. 14, 71 perches at $3 00		213 00
			$96698 05

SECTION No. 31.

With a descending grade of 55 feet per mile, the line continues down Little Aughwick creek. This section consists almost entirely of cutting, which for half a mile will average 22 feet. About one third of the excavation will be rock. The grubbing throughout a greater part of this section will be found alternately light and heavy. The curvature until the 38th mile will be found easy.

Grubbing,	$ 282 00
27335 cubic yards of common excavation at 15 cts.	4,100 25
12501 " " rock, at 50 cts.	6,250 50
2484 " " embankment, at 10 cts.	248 40
	$10,881 15

SECTION No. 32.

The line continues down Little Aughwick, retaining the same descending grade. The excavation exceeds the embankment more than half, and is one-third rock. The grubbing is scattered throughout the section. Drains No. 27 and 28 will be found necessary.

Grubbing,	$ 246 00
12669 cubic yards of common excavation, at 10 cts.	1,266 90
5000 " " rock, at 50 cts.	2,500 00
7324 " " embankment, at 12 cts.	878 88
Drain No. 27, 10 perches at $1 50.	15 00
" " 28, 10 " "	15 00
	$4,921 78

SECTION No. 33.

Continuing the same direction and grade, the excavation nearly doubles the embankment. Rather more than one-fourth of the excavation will be found to be rock. The grubbing for three-fourths of the section is heavy.

Grubbing,	$ 300 00
7564 cubic yards of common excavation, at 9 cts.	680 76
3000 " " rock, at 50 cts.	1,500 00
6531 " " embankment, at 12 cts.	783 72
	$8,264 48

SECTION No. 34.

This line continues down Little Aughwick creek, with a grade similar to that of the preceding section for four-fifths of a mile, and then descends at the rate of 44 feet per mile. The excavation exceeds the embankment but little and is all easy. The grubbing is heavy and covers three-fifths of the section. Drains No. 29, 30 and 31 will be required.

Grubbing,	$240 00
10774 cubic yards of common excavation at 9 cts.	969 66
8092 " " embankment, at 10 cts.	809 20

Drain No. 29, 19 perches, at $1 50.	28 50
" " 30, 10 " "	15 00
" " 31, 18 " "	27 00
	$2,089 36

Section No. 35.

With a grade of 44 feet per mile, the line still continues descending Little Aughwick creek. The embankment exceeds the excavation some little, but the surplus can easily be obtained. The grubbing is heavy for three-fourths of a mile. Drains No. 32 and 33, and a bridge 30 feet long over the Little Aughwick creek will be required.

Grubbing,	$312 00
7536 cubic yards of common excavation, at 9 cts.	678 24
11112 " " embankment, at 10 cts.	1111 20
Drain No. 32, 12 perches, at $1 50.	18 00
" " 33, 10 " "	15 00
Bridge No. 4,	482 50
	$2,616 94

Section No. 36.

Continuing down Little Aughwick creek the line passes Burnt Cabins. Retaining the grade of 44 feet per mile for seven stations, it then descends at the rate of 33.6 feet per mile. The grubbing is heavy and covers five stations. This section consists almost entirely of embankment, it can however be obtained immediately adjoining. Culvert No. 15, of four feet span will be required.

Grubbing,	$150 00
268 cubic yards of common excavation, at 9 cts.	24 12
20017 " " embankment, at 12 cts.	2402 04
Culvert No. 15, 59 perches, at $1 50.	88 50
	$2,664 66

Section No. 37.

The ground occupied by this section is very favorable, and the embankment and excavation nearly balance. The grade for nearly three-fourths of the section is similar to that of the one preceding it, and for the remainder descends at the rate of 18.80 feet per mile. Drain No. 34 will be required.

15514 cubic yards of common excavation, at 10 cts.	$1,551 40
12248 " " embankment, at 12 cts.	1,469 76
Drain No. 34, 13 perches, at $1 50.	19 50
	$3,040 66

Section No. 38.

The embankment of this section exceeds the excavation by half. A small quantity of rock will be found in the excavation. The grubbing extends throughout the section and is very heavy. The curvature will be abrupt at one point. Drain No. 35 and bridge No. 5, 60 feet long will be required.

Grubbing	$400 00
12855 cubic yards of common excavation at 10 cents,	1285 50
1234 " " rock at 50	617 00
24519 " " embankment at 15	3827 85
Drain No. 35, 14 perches at $1 50	21 00
Bridge No. 5	2725 35
	$8876 35

SECTION No. 39.

The excavation on this section will be easy and the embankment which forms the principal item can be obtained at little expense.—Grubbing extends over the greater portion of this section, and is heavy. From this to section No. 44 no heavy curvature will be necessary. Culverts No. 16 and 17, the former of 4 feet and the latter of 6 feet span, will be required. The grade descends at the rate of 16.28 feet per mile. The line continues to follow Little Aughwick creek until section No. 46 is reached.

Grubbing	$300 00
3097 cubic yards of common excavation at 9 cents,	278 73
19258 " " embankment at 12 cts.	2310 96
Culvert No. 16, 59 perches at $3 00	177 00
" " 17, 124 " "	372 00
	$3438 69

SECTION No. 40.

Throughout this entire section but a few yards of excavation occur. The embankment required can be easily obtained. The grade is similar to that of the preceding section, and a few stations of grubbing will be necessary. Drain No. 36 will be required.

Grubbing	$120 00
432 cubic yards of common excavation at 9 cents,	38 88
20004 " " embankment at 12 cts.	2400 48
Drain No. 36, 10 perches at $1 50	15 00
	$2574 39

SECTION No. 41.

The excavation on this section doubles the embankment. The eastern half of it consists entirely of embankment, and the western half of excavation ; in the latter some little rock will be found. The grade descends at the rate of 11.55 feet per mile. But a few chains of grubbing are necessary. Bridges No. 6 and 7, the former 70 feet and the latter 60 feet long will be required.

Grubbing	$48 00
37203 cubic yards of common excavation at 10 cents,	3720 30
2591 " " rock at 50 cts.	1295 50

19554 " " embankment at 14 cts.	2737 56
Bridge No. 6	2950 00
" 7	2725 00
	$13476 36

SECTION No. 42.

The excavation and embankment on this section are nearly balanced, the former is all easy. The grade of this is similar to that of the preceding section. Grubbing is necessary but for a few chains. Drain No. 37 will be necessary.

Grubbing	$30 00
15688 cubic yards of common excavation at 10 cents,	1568 80
19050 " " embankment at 12 cts.	2286 00
Drain No. 37, 17 perches at $1 50	25 50
	$3910 30

SECTION No. 43.

The excavation of this section exceeds the embankment by more than half and is all easy. The grade descends at the rate of 10 feet per mile. On about half of the section heavy grubbing will be necessary. Culvert No. 18 of 4 feet span, and drain No. 38 will be required.

Grubbing	$192 00
27168 cubic yards of common excavation at 10 cents,	2716 80
10969 " " embankment at 10 cts.	1096 90
Culvert No. 18, 64 perches at $3 00	192 00
Drain " 38, 10 " 1 50	15 00
	$4212 70

SECTION No. 44.

The embankment exceeds the excavation, the latter being all easy. The grade for the first third of the section descends at the same rate as during the preceding one, and for the remaining two-thirds at the rate of 15 feet per mile. Heavy grubbing will be necessary for nearly half of the section and the radius of curvature in one place approaches 1000 feet. Bridges No. 8 and 9, the former 90 feet and the latter 70 feet long, as also drain No. 39 will be required.

Grubbing	$180 00
5632 cubic yards of common excavation at 9 cents,	506 88
15158 " " embankment at 12 cts.	1818 96
Bridge No. 8,	4275 00
" " 9,	3825 00
Drain " 39, 14 perches $1 50	21 00
	$10626 84

SECTION No. 45.

As regards excess of embankment, this section resembles No. 44. The excavation is easy. The grade continues to descend at the rate of 15 feet per mile. The grubbing will be heavy on one-fourth of the section, and the curvature, although in one place it approaches to a radius of 1000 feet, does not exceed that limit. Drain No. 40 will be required.

Grubbing,	$ 105 00
4902 cubic yards of common excavation, at 9 cts.	441 18
13674 " " embankment, at 10 cts.	1,367 40
Drain No. 40, 14 perches, at $1 50,	21 00
	$1,934 58

SECTION No. 46.

The line continues down Little Aughwick creek, and crosses at the junction of Little Aughwick and Sideling hill creeks, and then pursues a course up Sideling hill creek. The grade for fifteen chains descends at the rate of fifteen feet per mile and then ascends at the rate of 5 feet per mile. The embankment exceeds the excavation. The deepest cutting is 30 feet. But a few chains of grubbing will be necessary. The curvature through the deep cutting is abrupt. Bridge No. 10, 70 feet long and drain No. 41 will be required.

Grubbing	$48 00
22195 cubic yards of common excavation at 10 cents,	2219 50
1260 " " rock at 50 cts.	630 00
35116 " " embankment at 12 cts.	4213 92
Bridge No. 10	6075 00
Drain " 41, 14 perches at $1 50	21 00
	$13207 42

SECTION No. 47.

Some deep cutting occurs during this section in which a small quantity of rock will be found. The grade continues to ascend at the rate of 5 feet per mile, and no abrupt curvature is found necessary. But a few chains of grubbing are required. Culvert No. 19 of 4 feet span, and bridges No 11 and 12, the former 60 feet and the latter 70 feet long will be required.

Grubbing		$36 00
62,339 cubic yards of common excavation at	12 cents,	7,480 68
5,182 " " rock at	50	2,591 00
22,306 " " embankment at	12	2,676 72
Culvert No. 19, 58 perches at	$3 00	174 00
Bridge " 11,		3,600 00
" " 12,		4,275 00
		$20,833 40

SECTION No. 48.

This section is composed principally of embankment; in what excavation occurs, however, there will be found some rock. The line follows Sideling Hill creek until section No. 60 is reached; throughout this section it ascends at the rate of 8 feet per mile, and at one point only is the curvature abrupt. The excess of embankment can be obtained adjoining. One third of the section will require grubbing. Drain No. 42 and bridge No. 13, 70 feet long are required.

	Grubbing			$120 00
6,589	cubic yards of common excavation at	9	cents,	593 01
1,151	" rock at	50	"	575 50
20,308	" embankment at	12	"	2,436 96
	Drain No. 42, 14 perches at	$1 50	"	21 00
	Bridge No. 13,			3,255 00
				$7,001 47

Section No. 49.

The grade ascends at the rate of 8 feet per mile. About one third of this section will require grubbing, and the curvature throughout is abrupt. The excavation exceeds the embankment by nearly one-half, and in it will be found a small quantity of rock. Drain No. 43, and bridge No. 14, 120 feet long will be required.

	Grubbing,			$102 00
23,180	cubic yards of common excavation at	12	cents,	2,781 60
2,468	" rock at	50	"	1,234 00
14,520	" embankment at	12	"	1,742 40
	Drain No. 43, 10 perches at	$1 50	"	15 00
	Bridge " 14,			4,380 00
				10,255 00

Section No. 50.

The embankment required exceeds the excavation by two thirds and can be obtained adjoining. One third of the section will require grubbing, and the curvature will be easy throughout. The grade ascends at the rate of 10 feet per mile. Drain No. 44, and bridge No. 15, 100 feet long will be required.

	Grubbing,			$96 00
2,956	cubic yards of common excavation at	9	cents,	266 04
10,629	" embankment at	10		1,062 90
	Drain No. 44, 16 perches at	$1 50		24 00
	Bridge No. 15, 100 feet long will be required.			3,450 00
				$4,898 94

Section No. 51.

The grade for 20 chains is similar to that of the preceding section, that of the remaining portion ascends at the rate of 20 feet per mile. The curvature is abrupt throughout, and the grubbing occupies about one fourth of its extent. The excavation is all easy.

Drain No. 45, and bridges No. 16, and 17, the former 100 feet, and the latter 70 feet long will be required.

Grubbing,		$72 00
12876 cubic yards of common excavation	at 9 cents,	1,158 84
9755 " embankment	10 "	975 50
Drain No. 45, 14 perches at	$1 50	21 00
Bridge No. 16,		3,450 00
Bridge No. 17,		2,975 00
		$8,652 34

SECTION No. 52.

The curvature of this section is all easy, and the grade ascends at the rate of 20 feet per mile. The embankment exceeding the excavation about one-third, can be obtained adjoining. On somewhat more than one third of this section heavy grubbing will be required. Drain No. 46, and bridge No. 18, 130 feet long will be required.

Grubbing,		$114 00
9934 cubic yards of common excavation	at 10 "	993 40
16263 " embankment	at 12 "	1,951 56
Drain No. 46, 15 perches	at $1 50	22 50
Bridge No. 18,		4,125 00
		$7,206 46

SECTION No. 53.

The grade for 8 chains ascends at the rate of 20 feet per mile, is then level for a half mile, and for the remainder of the section has an ascent of 28 feet per mile. One fourth of the section will require grubbing. The curvature is easy and the embankment and excavation nearly balance. Bridge No. 19, 70 feet long will be required.

Grubbing,		$90 00
9678 cubic yards of common excavation	at 9 "	871 02
12496 " embankment	at " 12	1,499 52
Bridge No. 19,		2,975 00
		$5,435 54

SECTION No. 54.

This section requires no abrupt curvature. The grubbing extends over about one fourth of the section, and the embankment and excavation balance one another. For the eastern half of the section the grade ascends at the rate of 28 feet per mile, the remainder is level. Drain No. 47, and bridge No. 20, 60 feet long will be required.

Grubbing,		$96 00
17018 cubic yards of common excavation	at 10 "	1,701 80
16157 " embankment	at 12 "	1,938 84

Drain No. 47, 18 perches at	$1 50	27 00
Bridge No. 20,		3,000 00
		$36,763 64

SECTION No. 55.

Ascending with a grade of 16 feet per mile, after two stations at the commencement of the section, which are level, grubbing is necessary for somewhat more than half the section, and the curvature is easy throughout. The excavation is all easy. Drains No. 48 and 49 will be required.

Grubbing,		$210 00
13792 cubic yards of common excavation at	9 cts.	1,241 28
3137 " embankment at	10 cts.	313 70
Drain No. 48, 10 perches at	$1 50	15 00
Drain No. 49, 10 perches at	$1 50,	15 00
		$1,794 98

SECTION No. 56.

This section is composed almost entirely of embankment which can be obtained adjoining. The grade ascends at the rate of 27 ft. per mile, and the curvature is easy throughout. About half of the section will require grubbing. Drain No. 50 will be necessary.

Grubbing,		$198 00
322 cubic yards of common excavation at	9 cts.	28 98
10805 " embankment at	12 cts.	1,296 60
Drain No. 50, 10 perches at	$1 50,	15 00
		$1,538 58

SECTION No. 57.

Passing through Sideling hill gap, the grade is similar to that of the preceding section, and the curvature is at no point abrupt. There occurs but little embankment, and the excavation is all easy. Grubbing will be necessary throughout three fourths of the section. Drain No. 51, and bridge No. 21, 30 feet long will be required.

Grubbing,		$322 00
16580 cubic yards of common excavation at	9 cts.	1,492 20
666 " embankment at	10 cts.	66 60
Drain No, 51, 10 perches at	$1 50,	15 00
Bridge No. 21,		182 50
		$2,078 30

SECTION No. 58.

A grade similar to that of the preceding section continues for two stations when it ascends at the rate of 50 feet per mile. The curvature is in some few places abrupt. The embankment which exceeds the excavation will be expensive on account of the roughness of the adjoining grounds. Grubbing will be required for one half of the section, Drain No. 52. and bridges No. 22 & 23, 70 feet and 60 feet long respectively will be necessary.

Grubbing,		$216 00
2451 cubic yards of common excavation at	9 cents,	220 59
26794 " " embankment at	13	3,483 22
Drain No. 52. 17 perches at	$1 50	25 50
Bridge No, 22,		2,175 00
" " 23,		2,750 00
		$8,870 31

SECTION No. 59.

This section is composed entirely of embankment which will be expensive for the same reason as given for that of the preceding section. The grade ascends at the rate of 50 feet per mile for one third of a mile and then at the rate of 60 feet per mile, somewhat upwards of one half of the section will require grubbing. The curvature is easy. Drains No. 53 and 54 and bridges No. 24, 70 feet long will be necessary.

Grubbing,		$234 00
79,031 cubic yards of embankment at	20 cents,	15,806 20
Drain No. 53, 21 perches at	$1 50	31 50
" " 54, 25 " "	1 50	37 50
Bridge No. 34,		4,900 00
		$21,009 20

SECTION No. 60.

Ascending at the rate of 60 feet per mile the line commences to approach Ground Hog valley, But one fourth of this section will require grubbing and no abrupt curvature is rendered necessary. The embankment and excavation are nearly equal. and in the latter some slate will be found. Culvert No. 20, 4 feet span, drain No. 55, and bridge 25, 70 feet long will be needed.

Grubbing,		$141 00
43459 cubic yards of common excavation, at	12 cents,	5,215 08
3699 " " " " slate,	" 25	924 75
56,903 " " " " embankment	" 12	6,828 36
Culvert No. 20. 100 perches at	$3 00	300 00
Drain No. 55, 40 " "	1 50	60 00
Bridge No. 25,		3,575 00
		$17,044 19

SECTION No. 61.

Continuing the same direction and grade this section contains about the same proportion of excavation, embankment and slate. Grubbing will be necessary for one third of it. and the curvature throughout will be slight. Drains No. 56 and 57 are necessary.

Grubbing,		$120 00
31267 cubic yards of common excavation at	10 cents,	3,126 70

2436 " " " slate at	25	609 00
46002 " " " embankment at	12	5,520 24
Drain No. 56, 28 perches at	$1 50	42 00
" " 57, 36 perches at	1 50	54 00
		$9,471 94

SECTION No. 62.

Still approaching the dividing ridge between Wells and Ground Hog valleys the grade and curvature are similar to those of the preceding section. The excavation exceeds the embankment by almost two-thirds, and much rock will be found in it. The deepest cutting is 71 feet, and the greatest filling 32 feet. Drains No. 58 and 59 will be required.

144,638 cubic yards of common excavation at	15 cents,	$21,695 70
31,969 " " " rock at	70	22,378 30
60,796 " " " embankment	12	7,295 52
Drain No. 58, 44 perches at	$1 50	66 00
" " 59, 23 "	1 50	34 50
		$51,470 02

SECTION No. 63.

Still ascending at the rate of 60 feet per mile and the curvature being light the line continues the same direction. The excavation and embankment very nearly balance, and in the former some rock will be found. One fourth of the section will require grubbing. Drain No. 60 and bridge No. 26, 1,320 feet long, to supply the place of the same length of very heavy embankment will be required.

Grubbing,		$90 00
127,786 cubic yards of common excavation at	15 cents,	19,167 90
33,220 " " " rock, "	70	23,254 00
153,814 " " " embankment at	18	27,686 52
Drain No. 60, 26 perches at	$1 50	39 00
Bridge No. 26, 1320 feet long,		72,004 00
		$142,241 42

SECTION No. 64.

The curvature of this section in some places is abrupt; the grade ascends 60 feet per mile. A few stations of grubbing will be necessary. The embankment exceeds the excavation, but the excess can be obtained at little cost adjoining. In the excavation some rock will be found. Culvert No. 21, 4 feet span, and drain No. 61 will be required.

Grubbing		$48 00
42,574 cubic yards of common excavation at	12 cents,	5,108 88
4,281 " " rock at	50	2,140 50
117,881 " " embankment at	20	23,576 20

Drain No. 61, 32 perches at	$1 50	48 00
Culv't " 21, 144 "	3 00	432 00
		$31,353 58

Section No. 65.

The line still approaches the dividing ridge with the same grade, and with a curvature abrupt but at one point. The grubbing will be light for one-third of the section. The embankment will exceed the excavation, but the excess can be obtained adjoining:

Grubbing		$72 00
52.534 cubic yards of common excavation at	12 cents,	6,304 08
67,352 " " embankment at	12	8,082 24
		$14,458 32

Section No. 66.

This section reaches Ground Hog valley and embraces a tunnel 35 chains long, passing through the dividing ridge between that and Well's valley. The grade, exclusive of the tunnel which is level, ascends at the rate of 60 feet per mile on the Eastern, and descends at the same rate on the western side of the tunnel. The curvature on the western side is abrupt. Grubbing will be necessary without the limits of the tunnel. The summit of the mountain is 139.5 feet above grade. The eastern end begins at a deep cut of 68 feet, and the western end opens into a cut of 67.5 feet. The rock to be excavated is stratified sand stone, and moderately hard, so that it can be worked out easily and still be sufficiently solid to support the superincumbent weight without requiring the aid of an arch of masonry. The working shafts are designed 660 feet from each end and 495 feet apart; they will be respectively 101, 118 and 112 feet deep from the surface of the ground to the crown of the tunnel, and of eight feet diameter.

Grubbing,		$108 00
91,904 cubic yards of common excavation at	14 cents,	12,866 56
10,000 " " rock at	50	5,000 00
12,283 " " embankment at	12	1,473 96
32,953.14 " " in tunnel	$3 00	98,859 42
616.15 " " in working shafts at	2 78	1,712 90
		$120,020 84

Section No. 67.

The line continues down Ground Hog valley until the Raystown branch of the Juniata is reached. Descending 60 feet per mile this section is composed almost entirely of excavation of which a great proportion will be rock. Where the section commences the curvature will be stiff. About three-fourths of it will require grubbing. Culvert No. 22, 4 feet span will be necessary.

Grubbing		$162 00
181,386 cubic yards of common excavation at 20 cents,		36,277 20
15,546 " " rock at	50	7,773 00
762 " " embankment at	10	76 20
Culvert No. 22, 58 perches at	$3 00	174 00
		$44,462 40

Section No. 68.

Still continuing the same grade and the curvature being easy, this section consists principally of excavation, a small portion of it being rock. About three-fourths of it will require grubbing. Drain No. 64, Culvert No. 23, 4 feet span, and bridge No. 27, 20 feet long will be required.

Grubbing		$168 00
27,278 cubic yards of common excavation at 10 cents,		2,727 80
2,048 " " rock at	50	1,024 00
6,438 " " embankment at	10	643 80
Drain No. 64, 10 perches at	$1 50	15 00
Culv't " 23, 58 "	3 00	174 00
Bridge " 27, 20 feet long,		390 00
		$5,142 60

Section No. 69.

The curvature and grade being similar to those of the preceeding section, this section contains a large excess of embankment, which although it may be obtained adjoining, will be expensive on account of the unfavorable nature of the ground. The grubbing extends throughout and is light. Drains No. 65 and 66, and Culvert No. 24, 6 feet span will be required.

Grubbing,		$156 00
34,090 cubic yards of common excavation at 12 cents,		4,090 80
4,070 " " rock	" 50	2,035 00
82,154 " " embankment	" 16	13,144 64
Drain No. 65, 26 perches at	$1 50	39 00
" " 66, 30 " "		45 00
Culvert No. 24, 124 " "	3 00	372 00
		$19,882 44

Section No. 70.

The grade and curvature continue the same. The embankment exceeds the excavation and will be expensive for the same reason assigned in the preceeding section. Some rock will occur in the excavation. The grubbing extends throughout the section and is generally light. Drain No. 67 will be necessary.

Grubbing,		$222 00
40,564 cubic yards of common excavation at	12 cents,	4,867 68
1,979 " " rock	" 50	989 50
131,903 " " embankment	" 14	18,466 42
Drain No. 67, 30 perches at	$1 50	45 00
		$24,590 60

SECTION No. 71.

The curvature and grade still continue the same. The embankment resembles that of the two preceding sections. Some rock will be found in the excavation. The entire section will require grubbing. Drain No. 68 and culverts No. 25 and 26 each of 6 feet span will be required.

Grubbing,		$246 00
14,206 cubic yards of common excavation at	10 cents,	1,420 60
1,682 " " rock	" 50	841 00
72,708 " " embankment	" 16	11,633 28
Drain No. 68, 27 perches at	$1 50	40 50
Culvert No. 25, 198 " "	3 00	594 00
" " 26, 213 " "	3 00	639 00
		$15,414 38

SECTION No. 72.

The ground occupied by this section is exceedingly rough, the grade continues the same, but the curvature is abrupt at one point. About one half of the section will require grubbing, The embankment of which there will be an excess will be expensive. Drains No. 69 and 70, and culverts No. 27 and 28 each of 6 feet span will be required.

Grubbing,		$150 00
30,445 cubic yards of common excavation at	10 cents	3,044 50
20,927 " " " rock "	50	10,463 50
149,552 " " " embankment at	16	23,928 32
Drain No. 69, 30 perches at	$1 50	45 00
" " 70, 44, " "	1 50	66 00
Culvert No. 27, 186, " "	3 00	558 00
" " 28, 341, " "		1,023 00
		$39,289 32

SECTION No. 73.

With a stiff curvature at points, this section passes out of Ground Hog valley, crosses the Raystown branch of the Juniata by a bridge 1,190 feet long and 90 feet above the surface of low-water and approaches Woodcock valley. The grubbing will extend over about half of the section. The grade is similar to that of the preceding section for three-fourths of a mile and level for the remaining fourth. There occur very deep cutting and high embankment. There is an excess of the latter however which will be expensive Much rock will be found in the excavation. Drain No. 71, and culvert No. 29, 4 feet span will be required.

Grubbing,		$120 00
78,961 cubic yards of common excavation	at 12 cents,	9,475 32
22,416 " " rock	" 50	11,208 00
157,381 " " embankment	" 15	23,607 15
Drain No. 71, 10 perches, at	$1 50	15 00
Culvert No. 29, 147, at	3 00	441 00
Bridge No. 28, 1,190 feet in length,		69,875 00
		$114,741 47

SECTION No. 74.

At the commencement of this section 8 chains are level, the remainder ascends at the rate of 50 feet per mile. Several places of abrupt curvature are necessary. Two-thirds of the section will require grubbing.

The excavation exceeds the embankment and some little rock will be found. Drains No. 72, 73, and 74, and culverts No. 30, and 31 each of 4 feet span will be required.

Grubbing,		$180 00
63,527 cubic yards of common excavation	at 12 cents,	7,623 24
4,936 " " rock	" 50	2,468 00
58,065 " " embankment	" 12	6,967 80
Drains No. 72 and 73, 57 perches	at $1 50	85 50
Drain No. 74, 26	" " 1 50	39 00
Culvert No. 30, 119	" " 3 00	357 00
" No. 31, 107	" " 3 00	321 00
		$18,041 54

SECTION No. 75.

The grade still ascends at the rate of 50 feet per mile, and the curvature is abrupt in one place. The grubbing which is generally light extends throughout the section. The embankment exceeds the excavation and can be easily obtained. Cutting 80 feet deep occurs and much rock will be found in the excavation. Drain No. 75 and culvert No. 32, 4 feet span will be necessary.

Grubbing		$234 00
22,880 cubic yards of rock at	50 cents,	11,440 00
131,199 " " common excavation at	12	15,743 88
172,478 " " embankment at	16	27,596 48
Drain No. 75, 37 perches at	$1 50	55 50
Culv't " 32, 97 "	3 00	291 00
		$55,360 86

SECTION No. 76.

Ascending Woodcock valley the grade for three stations ascends 30 feet per mile, and for the remainder of the section at the rate of 60 feet per mile. The curvature is easy throughout. Half of the section will require grubbing. Drain No. 76 will be necessary.

Grubbing			$174 00
69,769	cubic yards of common excavation at	12 cents,	8,372 28
5,182	" " rock at	50	2,591 00
44,700	" " embankment at	.12	53: 64
Drain No. 76, 13 perches at		$1 50	19 50
			$16,520 78

SECTION No. 77.

Still continuing up Woodcock Valley with an ascending grade of 60 feet per mile, involving no abrupt curvature, the line encounters one of the summits of the valley. The deepest cutting is 52 feet and in the excavation a large quantity of rock will be found. Light grubbing will be necessary throughout two-thirds of the section. Culvert No. 33, 4 feet span will be required.

Grubbing			$156 00
44,953	cubic yards of common excavation at	12 cents,	5,394 36
18,955	" " rock at	80	15,164 00
5,373	" " embankment at	10	537 30
Culvert No. 33, 58 perches at		$3 00	174 00
			$21,425 66

SECTION No. 78.

The grade and curvature resembling those of the preceding section the line passes over the first summit encountering very deep cutting, the deepest of which is 58 feet. In the excavation a large quantity of rock will be found. Only one-fourth of this section will require grubbing. Drain No. 77 will be necessary.

Grubbing			$90 00
140.367	cubic yards of common excavation at	12 cents,	16,844 28
113,391	" " rock at	80	90,712 80
Drain No. 77, 14 perches at		$1 50	21 00
			$107,668 08

SECTION No. 79.

This section commences with an ascending grade of 20 feet per mile. This grade continues for two stations, from which point it is level. The curvature is all easy. It contains little excavation, and the excess of embankment can be obtained adjoining. Light grubbing will be found throughout the section. Drains No. 78, 79 and 80 will be required.

Grubbing			$174 00
4,218	cubic yards of common embankment at	12 cents,	506 16

73,026 " " embankment at	14	10,223 64
Drain No. 78, 21 perches at	$1 50	31 50
" 79, 23 "	"	34 50
" 80, 10 "	"	15 00
		$10,984 80

Section No. 80.

This section is level for three-fourths of its extent, the remainder descends at the rate of 50 feet per mile. No abrupt curvature is necessary. Grubbing will be required throughout the entire section. There will be an excess of embankment but it can be easily obtained. About one-third of the excavation will be rock.

Grubbing		$234 00
17,327 cubic yards of common excavation at 10 cents,		1,732 70
9,318 " " rock at	50	4,659 00
32,878 " " embankment at	15	4,931 70
Drain No. 81, 16 perches at	$1 50	24 00
		$11,581 40

Section No. 81.

With a descending grade of 50 feet per mile and easy curvature the line descends towards the Raystown branch of the Juniata near Bloody Run. About one-fifth of the excavation will be rock. The grubbing is light throughout the section. Drain No. 82 will be required.

Grubbing,		$180 00
21,656 cubic yards of common excavation at 10 cents,		2,165 60
6,894 " " rock at	50	3,437 00
14,908 " " embankment at	10	1,490 80
Drain No. 82, 21 perches at	$1 50	31 50
		$7,304 90

Section No. 82.

The direction, grade, and curvature, (except at one point where it is abrupt) being the same, the excavation and embankment of this section will balance one another. Some rock will occur in the excavation. The entire section will require grubbing. Drain No 83, and culvert No. 34, 4 feet span will be required.

Grubbing.		$318 00
21,551 cubic yards of common excavation at 10 cents,		2,155 10
2,390 " " rock at	50	1,195 00
19,084 " " embankment at	10	1,908 40
Drain No. 83, 13 perches at	$1 50	19 50
Culvert No. 34, 127 at	3 00	381 00
		$5,977 00

SECTION No. 83.

Running up along the river the grade continues to descend at the rate of 50 feet per mile, and the curvature except at one point is easy. Half of the section will require grubbing. The excess of embankment can be obtained adjoining. A large quantity of embankment is avoided by substituting a bridge over the valley of Tassey's run, 800 feet long. Culvert No. 35, 4 feet span will also be required.

Grubbing,		$108 00
1,044 cubic yards of common excavation at 10 cents.		104 40
5,283 " " rock at	50	2,641 50
61,199 " " embankment at	13	9,179 85
Bridge No. 29, 800 feet long,		58,125 00
Culvert No. 35, 77 perches at	$3 00	231 00
		$50,389 75

SECTION No. 84.

The line follows the river until the 97th section is reached. The curvature is easy except at one point; the grade for the first half mile descends at the rate of 50 feet per mile, and for the remainder of the section at the rate of 12 feet. But a few chains of grubbing will be necessary. The excavation exceeds the embankment and rock will form a large portion of it. Drains No, 84 and 85 will be required.

Grubbing,		$24 00
29,205 cubic yards of common excavation at 10 cents,		2,920 50
17,038 " " rock at	50	8,519 00
19,149 " " embankment at	10	1,914 90
Drain No. 84, 39 perches at	$1 50	54 00
" " 85, 20 " "	1 50	30 00
		$13,462 40

SECTION No. 85.

With abrupt curvature at the commencement and a grade similar to that of the preceding section for the first half mile, and ascending at the rate of 95 feet per mile for the remainder of the section, the excavation will be greater than the embankment and contains some little rock. Some few stations of light grubbing will be necessary.

Grubbing,		$72 00
17,362 cubic yards of common excavation at 10 cents,		1,736 20
3,768 " " rock at	50	1,884 00
4,529 " " embankment at	10	452 90
		$4,145 10

SECTION No. 86.

Still ascending at the rate of 95 feet per mile for half the section and then at the rate of 10 feet for the remainder, and the curvature being in some places abrupt the line runs near the river bank. The entire section is formed of excavation, a portion of which will be rock. One-third of this section will require grubbing.

Grubbing,		$84 00
17,790 cubic yards of common excavation at	12 cents,	2,134 80
4,975 " " rock at	50	2,487 50
		$4,706 30

Section No. 87.

The grade for nearly half a mile ascends at the rate of 10 feet per mile, the remainder of the section is level. The curvature is abrupt. But a few stations of grubbing will be required. This section is composed principally of excavation in which rock will be met with. Drain No. 86 will be required.

Grubbing,		$50 00
19,740 cubic yards of common excavation at	12 cents,	2,368 80
6,570 " " rock at	50	3,285 00
7,774 " " embankment at	10	777 40
Drain No. 86, 15 perches at	$1 50	22 50
		$6,503 70

Section No. 88.

This section continues level for three-fourths of its extent, and then ascends at the rate of 14 feet per mile for the remainder. The curvature is abrupt at the commencement and end. Grubbing ocupies half of its extent. The excavation is all easy.

Grubbing,		$124 00
11,787 cubic yards of common excavation at	12 cents,	1,414 44
5,895 " " embankment	10	589 50
		$2,127 94

Section No. 89.

During this section Dunning's creek is crossed by a bridge 150 feet span, and the present channel of the Raystown branch of the Juniata (the channel will be changed to the left of the line) will be crossed by embankment. This section is composed almost entirely of embankment, and what little excavation occurs will be easy. Two or three stations of grubbing will be necessary. Drain, No. 87 will be required.

Grubbing,		$48 00
2362 cubic yards of common excavation at	10 cents,	236 20
75,572 " " embankment	16	12,091 52
Drain, No. 87, 28 perches at	$1 50	42 00
Bridge, 20,		6,500 00
		$18,917 72

Section No. 90.

The grade for one-fourth of a mile at the commencement of this section ascends at the rate of 14 feet per mile, the remainder is level.

The curvature is all easy. The excavation nearly doubles the embankment, and in it some little rock will be found. Drain No. 88 will be necessary.

46,884	cubic yards of common excavation at	12 cents,	$5,626 08
3,908	" " rock at	50	1,954 00
29,669	" " embankment at	10	2,966 90
	Drain No. 88, 25 perches at	$1 50	37 50
			$10,584 48

Section No. 91.

With an ascending grade of 10 feet per mile, this section commences with between 5 and 6 feet of embankment opposite Bedford and a few chains below the Hollidaysburg road. Crossing that road it follows up the bank of the stream through open fields. About the middle of it 10 chains of excavation occur, averaging about 6 feet deep. The remainder is ordinary excavation. Drains No. 89 and 90 will be necessary, also a little grubbing. The curvature is easy.

	Grubbing,		$5 00
10,948	cubic yards of common excavation at	9 cents,	985 32
4,655	" " embankment at	9	418 95
	Drains No. 89 and 90, 21 perches at	$1 75	36 75
			$1,446 02

Section No. 92.

At the commencement of this section and for nearly half its length there will be excavation from 4 to 10 feet in depth, when, entering upon lower ground it passes along the upper edge of Adam's meadow, where about 14 feet of embankment will be required. The line then strikes a point of the hill which bounds said meadow on the land side and terminates with 20 feet cutting. Drains No. 91 and 92 will be required and the grubbing will be light. The grade ascends 10 feet per mile and the curvature will be easy.

	Grubbing,		$20 00
24,251	cubic yards of common excavation at	10 cents,	2,425 10
24,250	" " embankment at	11	2,667 50
15,237	" " "	21	3,199 77
	Drains No. 91 and 92, 44 perches at	$1 60	70 40
			$8,382 77

Section No. 93.

This section has a quantity of excavation at both ends furnishing material for the embankment which intervenes. Drain No. 93 and one ditch will be required. Some light grubbing will occur. Grade 10 feet per mile ascending and curvature easy.

	Grubbing,		$10 00
58,950	cubic yards of common excavation at	12½ cents,	7,370 00
1,000	" " rock at	50	500 00

52,544 " "	embankment at	10	5,254 40
	Drain, No. 93, 20 perches at	$1 50	30 00
			$13,164 40

Section No. 94.

Passing through high ground in order to better the direction, a quantity of excavation is encountered for the first half mile, which however can be disposed of in the embankment of the latter half. Drains No. 94 and 95 and a ditch will be required. There will be two chains of light grubbing.

	Grubbing,		$10 00
56,756	cubic yards of common excavation at	13 cents,	7,378 28
2,100 " "	rock at	60	1,260 00
50,707 " "	embankment at	11	5,577 77
	Drains No. 94 and 95, 35 perches at	$1 60	56 00
			$14,282 05

Section No. 95.

This section commences with embankment in Todd's meadow: keeping the upper side of which excavation with some rock in it is met with on the hill side. Drain No. 96 will be required. The grade for the first 8 stations ascends 10 feet per mile, and for the remainder 29.25 feet per mile. The curvature is easy. Three chains of grubbing occur.

	Grubbing,		$10 00
20,706	cubic yards of common excavation at	10 cents,	2,070 50
5,940 " "	rock at	50	2,970 00
25,673 " "	embankment at	11	2,824 03
	Drain No. 96, 22 perches at	$1 50	33 00
			$7,907 53

Section No. 96.

This section is located along favourable ground, in cutting of from 1 to 10 feet in which some rock will be found. There will be grubbing for a short distance. The grade ascends 29.25 feet per mile. But slight curvature is required. A double drain and 20 chains of grubbing will be required.

	Grubbing,		$50 00
26,357	cubic yards of common excavation at	9 cents,	2,372 13
4,320 " "	rock at	60	2,592 00
13,515 " "	embankment at	9	1,216 35
	Drain No. 97, 50 perches at	$2 00	100 00
			$6,330 48

Section No. 97.

This section passes at first over side-long ground, excavation and embankment being alternate throughout the distance. Half way the line crosses the Raystown branch by a bridge of 100 feet span about 100 yards below the turnpike bridge. Drains No. 98, 99, 100, 101, and 102 as well as some grubbing will be required. There is but slight curvature and the grade continues ascending at the rate of 29.25 feet per mile.

Grubbing,		$25 00
35,626 cubic yards of common excavation at 12½ cents,		4,453 25
2,000 " " rock at	60	1,200 00
35,978 " " embankment at	8	2,878 24
Drains No. 98, 99, 100, 101 & 102, 100 perches at	$1 50	150 00
Bridge No 31,		4,350 00
		$13,056 49

SECTION No. 98.

There will be a good deal of deep and expensive cutting on this section with occasional heavy grubbing. The excavation is chiefly along the high land joining Will's and Buffaloe mountains and is partly rock. In crossing Trout run there is embankment as also at the end of the section. The grade rises 29.25 feet per mile for the first half mile, and then 31.56 per mile for the remainder of the section. A culvert over Trout run 15 span will be required, as also drains No. 103, and 104. The curvature is gentle and 40 chains of grubbing will be necessary.

Grubbing,		$100 00
52,071 cubic yards of common excavation at 14 cents,		7,289 94
10,000 " " rock at	50	5,000 00
40,369 " " embankment at	8	3,229 52
Culvert No. 36, 550 perches at	$3 00	1,650 00
Drains No. 103, and 104, 42 at	1 50	63 00
		$17,332 46

SECTION No. 99.

This section has excavation and embankment alternately, the latter preponderating. It passes along the base of Buffaloe mountain, and the cutting is stony. Drain No. 105 will be required.

The line will be nearly straight. The grubbing will be expensive and the grade ascends 31.56 feet per mile.

Grubbing,		$150 00
15,840 cubic yards of common excavation at 12½ cents,		1,980 00
3,091 " " rock at	50	1,545 50
18,932 " " embankment at	9	1,703 88
21,034 " " " "	21	4,417 14
Drain No. 105, 22 perches at	$1 75	38 50
		$9,835 02

Section No. 100.

This section is located along the base of the Buffalo mountain. The excavation is stony. Some light grubbing and drain No. 106 are required. The grade is similar to that of the preceding section and the curvature is easy.

	Grubbing,		$50 00
13,860	cubic yards of common excavation at	10 cents,	1,386 00
15,760	" " embankment at	10	1,576 00
1,899	" " rock at	50	949 50
354	" " embankment at	20	70 80
	Drain No. 106, 60 perches at	$1 50	90 00
			$4,122 30

Section No. 101.

This section lies also along the base of the Buffaloe mountain with ordinary difficulties, save the crossing at the Sulphur spring gap, where heavy embankment for a short distance occurs and a culvert of 10 feet span will be required. The excavation is occasionally of a stony character. The grade is similar to that of the preceding section and the curvature is easy. Grubbing comprises 40 chains.

	Grubbing,		$100 00
15,920	cubic yards of common excavation at	12½ cents	1,990 00
950	" " rock at	60	570 00
16,868	" " embankment at	8	1,349 44
27,162	" " " "	20	5,432 40
	Culvert No. 37 480 perches at	$2 75	1,320 00
			$10,761 84

Section No. 102.

This section has the same location as the preceding one. The excavation preponderates. Grubbing will be necessary for nearly the whole section. The celebrated Intermitting spring issues from the base of the Buffaloe mountain, a short distance from the upper end of this section. For the first half mile the grade ascends 31.56 feet per mile and for the remainder 50 feet per mile. The curvature is slight.

	Grubbing,		$350 00
32,364	cubic yards of common excavation at	12½ cents,	4,045 50
1,500	" " rock at	50	750 00
4,654	" " embankment at	8	372 32
			$5,517 82

Section No. 103.

This section extends from a short distance above the Intermitting spring ascending at the rate of 50 and 55 feet per mile to a point where a high bridge joining the Buffaloe mountain with a spur of the Dry ridge is to be erected. It is composed chiefly of excavation of which some rock will be found. The grubbing extends over the section.

Grubbing,					$300 00
40,010	cubic yards	of	common excavation at	12½ cents,	5,001 25
2,015	"	"	rock at	50	1,007 50
22,360	"	"	embankment at	10	2,236 00
					$8,544 75

Section No. 104.

In this section the passage from the Buffaloe mountain to the Dry ridge is to be effected by a very high bridge 1,700 feet in length, with high embankment at each end of it. On reaching the Dry ridge there is some cutting through slaty earth and rock, also some grubbing. The grade ascends 55 feet per mile and the curvature is gentle.

Grubbing					$100 00
21,447	cubic yards	of	common excavation at	11 cents	2,359 17
2,000	"	"	rock at	50	1,000 00
33,450	"	"	embankment at	15	5,017 50
19,330	"	"	" "	25	4,834 75
Bridge No. 32, 1700 feet long,					107,210 50
					$120,521 92

Section No. 105.

This section is on a spur of the Dry ridge. In keeping a good direction for the line, a considerable amount of excavation, interspesed with rock and slate is met with. There is also embankment near its western end. The grubbing continues for the whole distance, and the grade ascends 55 feet per mile.

Grubbing.					$400 00
42,674	cubic yards	of	common excavation at	10 cents,	4,267 40
10,000	"	"	rock at	50	5,000 00
15,000	"	"	slate at	25	3,750 00
50,937	"	"	embankment at	11	5,603 07
					$19 020 47

Section No. 106.

This section passes round a spur of the Dry ridge, in order to attain elevation. Abrupt curvature is necessary and a tunnel unavoidable. The Dry ridge tunnel commences in a cutting of 62.75 feet. and passes through solid slate rock for a distance of 1, 320 feet, terminating in open excavation of 65.50 feet.

Two working shafts will be required, one 148 feet, and the other 111 feet deep; the first will be sunk near the summit of the spur. They will be 330 feet apart, and 495 feet from each end. This tunnel must be protected from the crumbling effects of frost acting upon the slate, by constructing a substantial arch-way at each end 50 feet long. 60 chains of grubbing will be necessary, and continues rising at the rate of 55 feet per mile.

	Grubbing		$250 00
38,144	cubic yards of common excavation at	20 cents,	7 628 80
50,000	" " rock at	75	37,500 00
44,000	" " slate at	40	17,600 00
40,600	" " embankment at	10	4,060 20
196,9364	" " ex. in tunnel at	$3 10	61,050 28
482.12	" " in shafts at	2 53	1,219 76
1,434	perches of masonry in arches at	4 00	5,736 00
			$135,044 84

Section No. 107.

This section is located along a spur of Dry ridge. Rising with a grade of 55 feet per mile alternate excavation and embankment will occur. There will be some slate and rock. Culvert No. 38, 4 feet span, and drain No. 107 will be required. The grubbing will extend over the whole section.

	Grubbing,		$400 00
14,017	cubic yards of common excavation at	11 cents,	1,541 87
3,000	" " rock at	50	1,500 00
8,000	" " slate at	30	2,400 00
66,679	" " embankment at	10	6,667 90
	Culvert No. 38, 134 perches at	$3 00	402 00
	Drain 807, 22 " at	$1 50	33 00
			$12,944 77

Section No. 108.

In this section the Dry ridge is crossed at Metzger's tavern with a deep cut through slate and rock, and in following up the Northern side of it a deep spur must be crossed also involving deep cutting, twenty chains of grubbing, and drains No. 108 and 109 will be required. The curvature is easy.

	Grubbing,		$150 00
99,121	cubic yards of common excavation at	15 cents,	14.868 15
60,000	" " rock at	70	42,000 00
43,000	" " slate at	30	12,900 00
186,232	" " embankmeut at	10	18,623 20
	Drains No. 108 and 109, 60 perches at	$1 80	108 00
			$88,649 35

Section No. 109.

Through alternate heavy embankments and excavations, this section passes over the spurs and valleys of the side of Dry ridge. There is a good deal of slate and rock in the excavation. Drains No. 110, 111 and 112, and grubbing for the entire length of the section will be necessary. A part of this section has a grade of 57.50 feet per mile.

Grubbing,		$350 00
20,834 cubic yards of common excavation at 15 cents,		3.125 10
22,910 " " rock at	70	16,037 00
40,810 " " slate at	30	12,243 00
147,398 " " embankment at	10	14,739 80
100,000 " " "	15	15,000 00
Drains No. 110, 111 and 112, 180 perches at $1 75		315 00
		$61,8 9 90

SECTION No. 110.

Still on the side of Dry ridge this section contains much expensive work in crossing the valley and spurs. The excavation exceeds the embankment, but the excess can be disposed of in the east section. The grade ascends at the rate of 57.50 feet per mile. Drains No. 113 and 114, and grubbing for the entire length of the section will be required.

Grubbing,		$350 00
58,110 cubic yards of common excavation at 12½ cents,		7,263 75
60,000 " " rock at	55	33,000 00
41,000 " " slate at	25	10,250 00
122,877 " " embankment at	10	12,287 70
Drains No. 113 and 114, 120 p's at	$1 76	210 00
		$63,361 45

SECTION No. 111.

Still on the side of Dry ridge, excavations and embankments alternate throughout this section. Its entire length will require grubbing, and drain No. 115 will be required. The grade ascends at the rate of 57.5 feet per mile for the first quarter, after which 8 chains are level, when for the remainder it ascends 55 feet.

Grubbing,		$300 00
28,554 cubic yards of common excavation at 12½ cents,		3,569 25
10,148 " " rock at	60	6,088 80
18,392 " " slate at	25	4,598 00
58,032 " " embankment at	10	5,803 20
Drain No. 115, 50 perches at	$1 75	87 50
		$20,446 75

SECTION No. 112.

Still on the side of Dry ridge, this section is composed chiefly of excavation. Grubbing covers the entire section.

Grubbing,		$300 00
69,745 cubic yards of common excavation at 10 cents,		6,974 50
8,000 " " rock at	50	4,000 00
20,000 " " slate at	25	5,000 00
27,412 " " embankment at	9	2 467 08
		$18,741 58

SECTION No. 113.

In this section the summit of Dry ridge is very much depressed, and as it is nevertheless the highest ground to be found in the direction of the line, it is necessarily occupied with it. A high bridge is the means adopted for surmounting this difficulty. Bridge No. 33, will be 871 feet long. Drain No. 116 and light grubbing will be required. The curvature is easy and the grade ascends 55 feet per mile.

	Grubbing		$100 00
87,424	cubic yards of common excavation at	12½ cents,	10.928 00
10,000	" " slate at	25	2,500 00
104,518	" " embankment at	10	10,451 80
	Bridge No. 33, 871 feet long,		54,401 50
	Drain " 116, 30 perches at	$1 75	52 50
			$78,433 80

SECTION No. 114.

This section follows high ground dividing the waters of the Potomac and Susquehanna, a continuation of Dry ridge without bearing its name. Deep excavations and high embankments are encountered. Grubbing will be necessary throughout the section. Drain No. 117 and Culvert No. 39 of 4 feet span will be required. The grade ascends 55 feet per mile.

	Grubbing		$350 00
21,925	cubic yards of common excavation at	15 cents,	3,288 75
18,090	" " rock at	50	9,045 00
44,296	" " slate at	25	11,074 00
117,791	" " embankment at	10	11,779 10
	Culvert No. 39, 115 perches at	$3 00	345 00
	Drain " 117, 50 "	1 75	87 50
			$35,969 35

SECTION No. 115.

This section is on a spur of the Allegheny mountain dividing the waters of the Potomac and the Susquehanna. There is deep cutting in rock and much embankment. Culverts No. 40 and 41 each of 4 feet span, and Drains No. 118 and 119 will be required. Grubbing extends over the section and the grade ascends 55 feet per mile. Curvature easy.

	Grubbing		$350 00
31,999	cubic yards of common excavation at	12½ cents,	3,999 75
57,058	" " rock at	60	34,234 80
89,057	" " embankment at	10	8,905 70
19,413	" " "	25	4,853 25
	Culverts No. 40 and 41, 240 perches at	$3 00	720 00
	Drains " 118 " 119, 80 "	1 80	144 00
			$53,207 50

Section No. 116.

This section is on a spur of the Allegheny near the Somerset turnpike. Excavations and embankments alternate. There will be 16 chains of grubbing and the curvature will be easy.

	Grubbing		$80 00
19,818	cubic yards of common excavation at	12 cents,	2.477 25
12,000	“ “ rock at	50	6,000 00
28,659	“ “ embankment at	10	2,865 90
			$11,423 15

Section No. 117.

Still ascending a spur of the Allegheny at the rate of 55 feet per mile the excavation of this section is interspersed with slate and rock. Forty-four chains of grubbing will be required and the curvature is easy.

	Grubbing		$220 00
24.741	cubic yards of common excavation at	11 cents,	2,721 51
6,000	“ “ rock at	50	3,000 00
5,000	“ “ slate at	25	1,250 00
17,232	“ “ embankment at	10	1,723 20
			$8,914 71

Section No. 118.

Still on the Potomac and Susquehanna dividing ridge and rising towards the mountain 55 feet per mile, the excavation of this section is chiefly slate. The grubbing is heavy throughout. The curvature is easy.

	Grubbing		$400 00
4,893	cubic yards of common excavation at	11 cents,	538 23
19,220	“ “ slate at	25	4,805 00
7,972	“ “ embankment at	10	797 20
			$6,540 43

Section No. 119.

By this section the Allegheny mountain side is reached, but the ground close to the mountain is very low, forming a gap which must be crossed by a high bridge; the highest pier will be 50 feet in height. The bridge will be 1,700 feet long and the spans 170 feet each. The grade ascends 55 feet per mile and the curvature is easy. The grubbing extends throughout.

	Grubbing		$300 00
26.176	cubic yards of common excavation at	12½ cents,	3,272 00
30,000	“ “ rock at	50	15,000 00
56,175	“ “ embankment at	10	5,617 50
12,355	“ “ “	25	3,088 75
	Bridge No. 24, 1,700 feet in length,		68,541 00
			95,819 25

SECTION No. 120.

This section is on the Allegheny mountain side, north of the Somerset turnpike. The grade rises 55 feet per mile. Excavation preponderates and contains a considerable portion of rock. Grubbing throughout.

Grubbing			$400 00
38,970	cubic yards of common excavation at	12½ cents,	4,871 25
10,000	“ “ rock at	50	5,000 00
2,142	“ “ embankment at	10	214 20
			$10,485 45

SECTION No. 121.

Still on the Allegheny mountain side this section rises 55 feet per mile. The excavation resembles that of the preceding section. The grubbing extends throughout.

Grubbing			$400 00
18,504	cubic yards of common excavation at	12½ cents,	2,313 00
10,000	“ “ rock at	50	5,000 00
10,514	“ “ embankment at	10	1,051 40
			$8,764 40

SECTION No. 122.

Still on the Allegheny mountain side this section passes up through the gap formed by Deeter's run. The excavation is stony and the grubbing extends throughout. The grade ascends 55 feet per mile.

Grubbing			$400 00
15,978	cubic yards of common excavation at	12½ cents,	1,997 25
11,180	“ “ rock at	50	5,590 00
5,561	“ “ embankment at	10	556 10
			$8.543 35

SECTION No. 123.

This section contains the Allegheny tunnel and will be 12 chains longer than a mile. The tunnel will be 3,694 feet long, beginning on the east in a deep cut of 68 feet, and ending at the west in cutting of 75 feet. The ridge of the mountain over this work has very steep slopes, and by placing the working shafts on each side of the apex the deepest one will be 288 feet in depth. At least five shafts will be necessary 924 feet from each end of the tunnel and 462 feet apart; these will have respective depths of 213, 283, 288, 227 and 169 feet, the two first being on the east side of the mountain and the remainder on the west. The rock to be excavated is a homogeneous sand stone of a favorable texture for excavation, possessing at the same time firmness sufficient to sustain the pressure, so that no masonry will be required. Culvert No. 42 of 10 feet span and 36 chains of grubbing will be required. The grade ascends

55 feet per mile until the tunnel is reached, through which it will be level.

Grubbing					$150 00
5,122	cubic y'ds	of common	emb'kment at	12½ cts.	640 2
11,565	"	"	rock at	90	10,408 50
332,758	"	"	embankment at	20	66,551 60
52,684.65	"	"	excavat'n in tunnel	$5 44	286,604 50
21,967.66	"	"	" shafts	3 15	69,197 13
Culvert No. 42,	1,080 perches at			2. 50	2,700 00
					$436,251 98

SECTION NO. 124.

This section commences at the western termination of the Allegheny tunnel in cutting of 75 feet of sand stone rock, which excavation ceases in a distance of one-fourth of a mile. The embankment exceeds the excavation, but the surplus can be procured from the next section. This section is 12 chains less than a mile in length.—There will be 68 chains of grubbing. It is level for 24 chains and then descends 20 feet per mile for the remaining distance.

Grubbing					$275 00
70,187	cubic yards	of common	excavation at	85 cents,	59,658 95
70,187	"	"	embankment at	15	10,528 05
23,299	"	"	"	10	2,329 90
					$72,791 90

SECTION NO. 125.

This section is located on the western slope of the Allegheny mountain through alternate stony excavation and embankment.—There will be 36 chains of grubbing. The grade descends 20 feet per mile. The curvature is abrupt.

Grubbing					$100 00
26,686	cubic yards	of common	excavation at	11 cents,	2,935 46
15,000	"	"	rock at	50	7,500 00
21,178	"	"	embankment at	10	2,117 80
					$12,653 26

SECTION NO. 126.

Still on the mountain side this section descends 20 feet per mile for 16 chains, and for the remaining distance 40 feet per mile. The excavation is similar to that of the preceding section. There is a surplus of embankment which can be easily obtained. There will be 60 chains of ordinary grubbing and the curvature will be abrupt.

Grubbing,					$150 00
13,401	cubic yards	of common	excavation at	12½ cents,	1,675 25
6,020	"	"	rock at	50	3,010 00
46,699	"	"	embankment at	20	9.339 00
					$14,175 05

SECTION No. 127.

This section is on the western side of the Allegheny mountain and pproaches the dividing ridge between the waters of the Conemaugh d the Youghiogheny. The excavation preponderates. The grub- ing covers the entire section. The grade descends 40 feet per mile r 4 stations, and for the remainder 10½ feet per mile. Drain No. 20 will be required.

Grubbing		$200 00
1,524 cubic yards of common excavation at	11 cts.	2,367 64
6,000 " " rock at	50	3,000 00
1,123 " " embankment at	10	1,112 30
Drain No. 120. 70 perches at	$1 50	105 00
		$6,784 94

SECTION No. 128.

The section commences with embankment. The excavations and mbankments alternate for the remainder of the distance. Drains o. 121 and 122 and 36 chains of grubbing will be required. The rade descends 10.5 feet per mile.

Grubbing,		$180 00
8,446 cubic yards of common excavation at	12½ cents	4,805 75
2,190 " " rock at	50	6,045 00
1,728 " " embankment at	10	2,172 80
Drains No. 121 & 122, 50 perches at	$1 50	75 00
		$13,278 55

SECTION No. 129.

This section consists chiefly of embankment; which however, can e procured close at hand. There is but little grubbing and the line straight. The grade descends 105 feet per mile for the first 16 hains, and 50 feet per mile for the remainder of the distance.

Grubbing,		$40 00
0,522 cubic yards of common excavation at	11 cents,	1,157 42
0,522 " " embankment at	9	946 98
5,413 " " "	11	6,095 43
		$8,239 83

SECTION No. 130.

This section is on the ridge dividing the waters of the Conemaugh nd the Youghiogheny. It is near Berlin. There will be excava- ion and embankment, the first preponderates, however. Some rock nd stone coal will be found in the excavation. 16 chains of grub- ing and drain No. 123 will be necessary. The grade descends 50 eet per mile for the first 16 chains, and 16 feet per mile for the re naining distance. This section will be one uniform curve, whose adius will be more than a mile long.

Grubbing,		$80 00
1,154 cubic yards of common excavation at	11 cents,	5,626 94

20.000 " "	rock at	50	10,000
29,186 " "	embankment at	9	2,626 7
Drain No. 123. 30 perches at		$1 50	45
			$18,378 6

SECTION No. 131.

This section passes over the open ground on the north side Berlin; it consists almost entirely of embankment which must h procured from the adjoining sections. For the first 32 chains th grade descends 16 feet per mile, and for the remaining distance ascends 26 feet per mile. Drains No. 124, 125, and 126, will be required.

2,990 cubic yards of	common excavation at	11 cents,	$328 9
3,000 " "	slate at	20	600 0
5,990 " "	embankment at	10	599 0
218,308 " "	" "	20	43,661 6
Drains No. 124, 125 & 126, 105 perches at		$1 50	157 5
			$15,347 0

SECTION No. 132.

This section leaves Berlin on the south and follows the dividing ridge passing by a a straight line over it. Uneven ground is encountered which involves much deep excavation. Some rock and slate will be found in the cutting. Drain No. 127 and 28 chains of grubbing will be necessary. The grade for 56 chains ascends 26 feet per mile, and descends 10 feet per mile for the remainder of the section.

Grubbing,			$140 00
103,544 cubic yards of	common excavation at	12½ cents,	12,943 00
31.000 " "	rock at	50	15,500 00
45,000 " "	slate at	20	9,000 80
24,365 " "	embankment at	10	2,436 50
Drain No. 127, 30 perches at		$1 50	45 00
			$40,064 50

SECTION No. 133.

The line bears the same character in this vicinity throughout. The summit of the dividing ridge must be adhered to, in order to overcome the great elevations which present themselves in this mountainous region. There is therefore but little choice of position for the line and expensive work is the consequence. Drains No. 128 and 129 and 28 chains of grubbing are required. The grade descends for 28 chains 10 feet per mile, and then ascends 50 feet per mile.

Grubbing,			$125 00
37,456 cubic yards of	common excavation at	12½ cents,	4,682 00
8,000 " "	rock at	50	4,000 00
45,455 " "	embankment at	10	4,545 50

,227 " "	"	20	10,845 40
Drains No. 128 and 129, 90 p's at		$1 50	135 00
			$24,332 90

SECTION No. 134.

ommencing at the foot of Negro ridge and ascending with a le of 50 feet per mile, the line passes by a circuitous route round the of a spur of the ridge, which here presents itself. Culvert No. 43 feet span, and drain No. 130 as also 24 chains of grubbing will equired.

Grubbing,			$75 00
249 cubic yards of common excavation at 11 cents,			2,447 39
326 " "	rock at	50	10,663 00
54 " "	embankment at	10	4,365 40
00 " "	"	21	210 00
Culvert No. 43, 60 perches at		$3 00	180 00
Drain 130, 30 "		$1 50	45 00
			$17,985 79

SECTION No. 135.

uring this section the line passes along the side of Negro ridge, ly in excavation, of which a proportion is rock. Culvert No. 44 feet span and 56 chains of grubbing will be required. The ascends 50 feet per mile.

Grubbing,			$225 00
16 cubic yards of common excavation at 10 cents,			3,651 60
30 " "	rock at	50	14,065 00
05 " "	embankment at	9	728 55
Culvert No. 44, 60 perches at		$3 00	180 00
			$18,850 15

SECTION No. 136.

ll ascending Negro ridge alternate excavations and embankare necessary; the latter, however, preponderating. The curis abrupt. For the first 56 chains the grade ascends 50 feet ile, for the remainder 25 feet per mile. Drains No. 131 and d 60 chains of grubbing will be necessary.

rubbing,			$275 00
cubic yards of common excavation at 11 cents,			2,538 91
" "	rock at	50	13,050 00
" "	embankment at	10	8,036 00
rains No. 131 and 132, 60 p's at		$1 50	90 00
			$23,989 91

SECTION No. 137.

ascending Negro ridge and close to the summit there will be uantities of excavation and embankment. The first 32 chains are level, the remainder ascends at the rate of 50 feet per mile. Grubbing for 50 chains and drain No. 133 will be required.

Grubbing,		$220 6
70,466 cubic yards of common excavation at	12½ cents,	8,808 2
33,000 " " rock at	50	16,500 0
63,399 " " embankment at	10	6,339 9
Drain No. 133, 25 perches at	$1 50	37 5
		$31,905 6

Section No. 138.

In this section the summit of Negro ridge is crossed, and the ridg dividing the waters of the Youghiogeny and the Conemaugh is attained. There is a good deal of excavation in rock and earth at the summit and the embankment following it. The grade ascends at th rate of 50 feet per mile, for the first 4 chains, is level for 32 chain descends 15 feet per mile for 24 chains, and level for the remainin distance. Drain No. 134 and 64 chains of grubbing are necessar

Grubbing,		$200 0
55,534 cubic yards of common excavation at	12½ cents,	6,941 7
25,093 " " rock at	50	12,546 5
68,025 " " embankment at	10	6,802 5
Drain No. 134, 30 perches at	$1 50	45
		$26,555 7

Section No. 139.

This section will be nearly all excavation, some of which will be dee The first 36 chains are level, the remaining distance has a desce of 50 feet per mile. Very little grubbing will be required.

Grubbing		$5
72,743 cubic yards of common excavation at	11 cents,	8,001
10,000 " " rock at	50	5,000
40,000 " " slate at	25	10,000
501 " " embankment at	10	50
		$23,056

Section No. 140.

This section consists almost entirely of embankment. The gra descends 50 feet per mile for the first sixteen chains, and descen for the remaining distance at the rate of 60 feet per mile. Twent four chains of grubbing will be required.

Grubbing		$64
15,179 cubic yards of common excavation at	11 cents,	1,669
8,111 " " slate at	25	2,027
23,290 " " embankment at	9	2,096
102,811 " " "	20	20,562
		$26,419

Section No. 141.

This section is located on the summit of the Dividing ridge which here commences falling rapidly, and in order to save great expense at its lowest depression two miles forward, the heavy grade of 60 feet per mile was necessarily adopted. The excavation preponderates. Forty-eight chains of grubbing and Drain No. 135 will be required.

Grubbing		$150 00
43,482 cubic yards of common excavation at	12½ cents,	5,435 25
21,340 " " rock at	50	10,670 00
30,380 " " slate at	25	7,595 00
36,094 " " embankment at	9	3,248 46
Drain No. 135, 30 perches at	$1 50	45 00
		$27,143 71

Section No. 142.

The grade of 60 feet per mile is still continued, but such is the rapid descent of the ridge that embankment will be required throughout, with the exception of one point where there will be excavation. There will be 56 chains of ordinary grubbing.

Grubbing		$165 00
1,741 cubic yards of common excavation at	11 cents,	191 51
1,000 " " rock at	50	500 00
73,324 " " embankment at	22	16,131 28
		$16,987 79

Section No. 143.

This section is still on the summit of the ridge, and descending 60 feet per mile. The embankment exceeds the excavation. Thirty-four chains of light grubbing are required.

Grubbing		$100 00
27,007 cubic yards of common excavation at	11 cents,	2,970 77
12,938 " " rock at	50	6,469 00
39,945 " " embankment at	10	3,994 50
58,520 " " "	22	12,874 40
		$26,408 67

Section No. 144.

This section follows the summit of the Dividing ridge and keeps close to the Powder Mill road. A barn must be moved to give place to its location. The unevenness of the ground will create great expenditure. There will be 44 chains of grubbing. The grade descends at the rate of 60 feet per mile for the first 16 chains, and at 20 feet per mile for the remaining distance.

Grubbing		$100 00
95,948 cubic yards of common excavation at	12½ cents,	11,993 50

40,000	" " rock at	60	24,000 00
45,975	" " embankment at	15	6,896 25
	Removal of barn,		400 00
			$43,389 75

SECTION No. 145.

This section will be very expensive. The ridge is depressed to within very little of its lowest elevation between the Allegheny and Laurel Hill, and although the heavy descending grade of 60 feet per mile was assumed, there is still much embankment. For the first 16 chains the grade descends 20 feet per mile, the next 40 chains are level and the remaining distance ascends 50 feet per mile. 52 chains of grubbing are required.

	Grubbing		$200 00
2,800	cubic yards of common excavation at	12½ cents,	350 00
2,800	" " embankment at	8	224 00
100,000	" " "	11	11,000 00
232,506	" " "	25	58,126 50
			$69,900 50

SECTION No. 146.

Again an elevation of the ridge occurs, in surmounting which the heavy grade of 60 feet per mile is adopted. The excavations and embankments alternate on this mile but the first is much the greater. The grade is 50 feet per mile for 16 chains, 60 feet per mile for the next 54 chains, and level for the remaining distance. Forty-eight chains of grubbing will be required.

	Grubbing,		$125 00
59,982	cubic yards of common excavation at	12½ cents,	7,372 75
21,600	" " rock at	60	12,960 00
53,050	" " embankment at	10	5,305 00
			$25,762 75

SECTION No. 147.

The elevation which was ascended in the last mile is descended on the western side in this section. For two chains at the summit the road is level. The remaining distance has a descending grade of 60 feet per mile. Eight chains of light grubbing will be necessary.

	Grubbing,		$15 00
39,686	cubic yards of common excavation at	11 cents,	4,365 46
3,950	" " rock at	50	1,975 00
12,685	" " embankment at	10	1,268 50
			$7,623 96

SECTION No. 148.

Still following the ridge undulations are encountered which are more or less expensive. The ground for nearly the whole of this section is very much depressed and embankments is thereby rendered necessary. There is but little excavation. For the first 32 chains the grade descends 60 feet per mile, for the next 42 chains the line is level, the remainder ascends 36.8 feet per mile. Drains No. 136 and 137, and 20 chains of grubbing are required.

	Grubbing,		$50 00
5,744	cubic yards of common excavation at	12½ cents,	718 00
5,744	" " embankment at	10	574 40
111,126	" " "	22	24,447 72
	Drains No 136 & 137, 70 perches at	$1 50	105 00
			$25,895 12

SECTION No. 149.

Again heavy excavations and embankments render the line expensive. The excavation will be slaty. There will be 24 chains of grubbing, and the grade ascends 36.80 feet per mile.

	Grubbing,		$100,00
51,202	cubic yards of common excavation at	12½ cents,	6,400 25
57,809	" " slate at	25	14,452 25
109,012	" " embankment at	10	10,901 20
42,057	" " " "	23	10,823 11
			$41,676 81

SECTION No. 150.

At the commencement of this section there is embankment, in the middle excavation, and at the further end embankment. The excavation exceeds the embankment slightly. The grade for the first 16 chains ascends 36.8 feet per mile, descends 20 feet per mile for the next 40 chains, and 60 feet per mile for the remaining distance. Drain No. 138 will be required.

27,280	cubic yards of common excavation at	11 cents,	$3,000 80
61,320	" " slate at	25	15,330 00
83,973	" " embankment at	10	8,397 30
	Drain No. 138, 40 perches at	$1 50	60 00
			$26,788 10

SECTION No. 151.

Here again is a very expensive section, the surface of the ridge becoming more rugged as it approaches Laurel Hill. There is rock as also slate in the excavation. The grade descends 60 feet per mile. Forty eight chains of grubbing are necessary.

	Grubbing,		$125 00
10,848	cubic yards of common excavation at	12½ cents,	1,356 00
20,000	" " rock at	50	10,000 00
30,000	" " slate at	25	7,500 00
60,848	" " embankment at	10	6,084 80
111,377	" " "	25	27,844 25
			$52,910 05

SECTION No. 152.

This section will also be very expensive, the hollow of the ridge over which it passes requiring much heavy embankment. The grade for 16 chains descends 60 feet per mile, the next 40 chains are level and the remainder ascends 35 feet per mile. The excavation is stony. Drains No. 139 and 140 will be required.

17,994	cubic yards of common excavation at	12½ cents,	$2,248 25
35,000	" " rock at	50	17,500 00
10,890	" " slate at	25	2,722 50
63,975	" " embankment at	10	6,397 50
119,634	" " "	25	29,908 50
	Drains No. 139 & 140, 70 perches at	$1 50	105 00
			$58,881 75

SECTION No. 153.

With this section may be said to commence the ascent of Laurel Hill, the ground is very rough and the cost of construction will be heavy. The grade ascends 35 feet per mile. Sixty eight chains of grubbing and drains No. 141 and 142 will be required.

	Grubbing		$250 00
26,072	cubic yards of common excavation at	12½ cents,	3,259 00
40,000	" " slate at	25	10,000 00
66,972	" " embankment at	10	6,697 20
44,291	" " "	25	11,072 75
	Drains No. 141 and 142, 70 ps at	$1 50	105 00
			$31,383 95

SECTION No. 154.

This section is located on the side of Laurel Hill, ascending for the first 24 chains 35 feet per mile, and 48.57 feet per mile for the remaining distance. The embankment exceeds the excavation. Zimmerman's house must be removed. Culvert No. 45 of 6 feet span and 40 chains of grubbing will be required.

	Grubbing,		$200 00
22,243	cubic yards of common excavation at	11 cents,	246 73
15,000	" " rock at	50	7,500 00
17,243	" " embankment at	10	1,724 30
30,258	" " "	25	7,564 50
	Culvert No. 45, 155 perches at	$3 00	465 00
			$17,700 53

SECTION No. 155.

Still ascending the side of Laurel Hill stony excavation is encountered for nearly the entire distance. The grade for about three-fourths of a mile ascends 48.57 feet per mile, and for the remainder 50 feet per mile. Bridge No. 35, 120 feet long, and culvert No. 46 of 9 feet span will be required. The grubbing continues throughout and the curvature is abrupt.

Grubbing,			$332 00
44,274 cubic yards of	common excavation at	12½ cents,	5,534 25
6,572 " "	embankment at	10	657 20
8,779 " "	detached rock at	50	4,389 59
3,404 " "	solid "	60	2,042 40
Bridge No. 35,			10,631 00
Culvert 46,	133 perches at	$3 00	399 00
			$23,985 35

Section No. 156.

The greater part of this section consists of excavation, and in some places the cutting is deep. The grade of 50 feet per mile is extended for about three fourths of the distance, for the remainder it ascends 55 feet per mile. Ordinary grubbing extends throughout.

Grubbing			$280 00
351,302 cubic yards of	common excavation at	13 cents,	45,669 26
11,260 " "	embankment at	10	1,126 00
81,365 " "	detached rock at	50	40,682 50
2,426 " "	solid "	80	1,940 80
			$89,698 56

Section No. 157.

The excavation on this section nearly suffices to make the embankment. Grubbing is necessary throughout. The grade ascends 55 feet per mile.

Grubbing			$305 00
19,997 cubic yards of	common excavation at	11 cents,	2,199 67
21,432 " "	embankment at	10	2,143 20
4,923 " "	detached rock at	50	2,461 50
			$7,109 37

Section No. 158.

This section consists almost entirely of excavation, none of it being very deep. The grade ascends 55 feet per mile. Heavy grubbing for the whole section as well as Drain No. 143 will be required.

Grubbing			$385 00
25,288 cubic yards of	common excavation at	11 cents,	2,781 68
11,273 " "	embankment at	10	1,127 30
9,210 " "	detached rock at	50	4,605 00
Drain No. 142,	10 perches at	$1 50	15 00
			$8,913 98

Section No. 159.

The first part of this section consists of embankment, the middle of excavation, and the latter part of embankment, making nearly an equal quantity of each. Culverts No. 47 and 48, the former of 9 feet and the latter of 7 feet span, will be required. The grade ascends 55 feet per mile for three-fourths of the distance and for the remainder 50 feet per mile.

Grubbing			$360 00
27,064	cubic yards of common excavation at	11 cents,	2,977 04
39,120 " "	embankment at	10	3,912 00
5,153 " "	detached rock at	50	2,576 50
4,028 " "	solid "	60	2,416 80
Culvert No. 47,	225 perches at	$2 90	652 50
" " 48,	290 "	3 00	870 00
			$13,764 84

SECTION No. 160.

This section is very uneven. The excavation will furnish a sufficiency of earth to complete the embankment. Culvert No. 49 of 9 feet span, and drain No. 143 are necessary. The grubbing is heavy throughout. The grade ascends 50 feet per mile.

Grubbing			$400 00
24,074	cubic yards of common excavation at	11 cents,	2,659 14
31,452 " "	embankment at	10	3,145 20
4,016 " "	detached rock at	50	2,008 00
3,446 " "	solid "	55	1,895 30
Culvert No. 49,	214 perches at	$2 90	620 60
Drain " 143,	21 "	1 50	31 50
			$10,759 74

SECTION No. 161.

The excavation on this section will make the embankment, culvert No. 50 of 9 feet span will be required. Heavy grubbing continues throughout. The grade still ascends 50 feet per mile.

Grubbing,			$400 00
22,285	cubic yards of common excavation at	10 cents,	2,228 50
24,198 " "	embankment at	11	2,661 78
6,528 " "	detached rock at	50	3,264 00
Culvert No. 50,	274 perches at	$3 00	822 00
			$9,376 28

SECTION No. 162.

There will be an excess of embankment required, but it can be obtained adjoining. The grade for the first half mile ascends 50 feet per mile, the next thirty-two chains 20 feet per mile, and the remainder is level. The summit of Laurel hill is reached. Heavy grubbing and drain No. 144 will be required.

Grubbing,			$400 00
17,112	cubic yards of common excavation at	11 cents,	1,882 32
8,708 " "	embankment at	10	870 80

4,888 " " detached rock at	50	2,444 00
Drain No. 144, 11 perches at	$1 50	16 50
		$5,613 62

SECTION No. 163.

The excavation of this section contains some solid rock. The western side of Laurel hill is descended by a grade of 50 feet per mile; the first four chains of this section, however, descends 20 feet per mile. The grubbing is heavy.

Grubbing,		$400 00
37,274 cubic yards of common excavation at	11 cents,	4,097 94
20,512 " " embankment at	10	2,051 20
8,055 " " detached rock,	50	4,027 50
7,120 " " solid rock, at	60	4,272 00
Culvert No. 51, 72 perches at	$2 90	208 80
		$15,057 44

SECTION No. 164.

This section will be expensive, requiring heavy embankment and deep cutting. Bridges No. 36 and 37; the former 410 feet and the latter 100 feet long, as also culvert No. 52, of 12 feet span will be required. The grade descends 50 feet per mile and the grubbing is heavy.

Grubbing,		$400 00
71,004 cubic yards of common excavation at	12½ cents,	8.875 50
122,081 " " embankment at	13	15,870 53
12,912 " " detached rock at	50	6,456 00
Bridge No. 36,		31,922 50
" " 37,		13,057 50
Culvert 52, 207 perches at	$3 00	621 00
		$77,203 03

SECTION No. 165.

There are only eight chains of embankment on this section, the balance being moderate excavation containing some detached rock. Drain No. 145 will be required. The grubbing throughout the section is heavy, and the grade descends 50 feet per mile.

Grubbing,		$400 00
18,805 cubic yards of common excavation at	11 cents,	2,068 55
13,572 " " embankment at	10	1 357 20
7,173 " " detached rock at	50	3,586 50
Drain No. 145, 42 perches at	$1 50	63 00
		$7,475 25

SECTION No 166.

The excavation on this section will not yield a sufficient quantity of earth to make the embankment, some of which will be heavy, but the amount required can be obtained from the adjoining section. Culverts No. 53, 54 and 55, the first of 9 feet and the remaining two of 6 feet span each will be necessary. The grade descends 50 feet per mile and the grubbing is heavy threughout the section.

	Grubbing,		$380 00
25,046	cubic yards of common excavation at	12½ cents,	3,130 75
44,934	“ “ embankment at	14	6,290 76
5,742	“ “ solid rock at	65	3,732 30
	Culvert No. 53, 260 perches at	$2 90	754 00
	“ 54, 180 “	3 00	540 00
	“ 65, 62 “	“	186 00
			$15,013 81

SECTION No. 167.

This section contains an equal amount of excavation and embankment. Some rock will be found in the excavation. Bridge No. 38, 250 feet long will be necessary. The grade continues to descend 50 feet per mile and the grubbing is heavy throughout.

	Grubbing,		$400 00
51,786	cubic yards of common excavation at	11 cents,	5,696 46
69,825	“ “ embankment at	10	6,982 50
3,057	“ “ detached rock at	45	1,375 65
13,440	“ “ solid “	60	8,064 00
	Bridge, No. 38,		13,790 50
			$36,309 11

SECTION No. 168.

The excavation on this section exceeds the embankment considerably. Some rock will be found in the excavation. Bridge No. 39, 50 feet long will be required. The grubbing is ordinary, and the grade descends 50 feet per mile for three-fourths of a mile, and for the remainder it is level.

	Grubbing,		$300 00
65,674	cubic yards of common excavation at	10 cents,	6,567 40
8,648	“ “ embankment at	11	951 28
3,842	“ “ detached rock at	45	1,728 90
16,205	“ “ solid “	55	8,912 75
	Bridge No. 39,		1,332 50
			$19,792 83

SECTION No. 169.

The ground on this section is very undulating, and the embankment will exceed the excavation. Bridge No. 40, 390 feet long, and culvert No. 56 of 8 feet span will be required. The first 16 chains are level, and the grade for the remaining distance descends 55 feet per mile. Grubbing continues throughout.

	Grubbing,		$300 00
38,670	cubic yards of common excavation at	12½ cents,	4,833 75

82,527 " " embankment at	13	10,728 51
9,539 " " detached rock at	50	4,769 50
5,738 " " solid " "	60	3,442 80
Bridge No. 40,		39,508 50
Culvert No. 56, 226 perches at	$3 00	678 00
		$64,261 06

SECTION No. 170.

On this section deep cutting and heavy embankment cannot be avoided, a large quantity of the former is solid rock. Bridge No. 41, 260 feet long, and culvert No. 57 of 10 feet span will be required. The grade and grubbing resemble those of the preceding section.

Grubbing,		$280 00
71,150 cubic yards of common excavation at	11 cents,	7,826 50
44,271 " " embankment at	10	4,427 10
34,599 " " solid rock at	60	20,759 40
Bridge No. 41,		24,834 00
Culvert No. 57, 463 perches at	$3 00	1,389 00
		$59,516 00

SECTION No. 171.

Some heavy cutting and embankment will be encountered on this section. The grade descends 55 feet per mile for three-fourths of the section and 20 feet per mile for the remainder. Bridges No. 42 and 43, the first 100 feet and the second 120 feet long will be required. The grubbing is similar to that of the preceding section.

Grubbing,		$320 00
67,330 cubic yards of common excavation at	12½ cents,	8,416 25
24,853 " " embankment at	10	2,485 30
24,884 " " solid rock	55	13,686 20
Bridge No. 42,		4,422 00
" " 43,		3,776 00
		$36,705 75

SECTION No. 172.

This section can be easily made. The grade for the first 4 chains descends at the rate of 20 feet per mile, and for the remaining distance 60 feet per mile. Culvert No. 58 of 6 feet span and drain No. 146 will be necessary. Heavy grubbing continues throughout.

Grubbing,		$300 00
22,929 cubic yards of common excavation at	11 cents,	2,522 19
11,605 " " embankment at	10	1,160 50
5,116 " " solid rock at	55	2,813 80
Culvert No 58, 124 perches at	$3 00	372 00
Drain No. 146, 11 " "	1 50	16 50
		$7,184 99

SECTION No. 173.

The embankment of this section exceeds the excavation, but the excess can be obtained conveniently. Bridge No. 44, 60 feet long, culverts No. 59 and 60, the former of 9 feet and the latter of 6 feet span, and drain No. 147 will be required. The grade is similar to that of the preceding section, and the grubbing is ordinary.

Grubbing,		$285 00
14,854 cubic yards of common excavation at	12½ cents,	1,856 75
32,851 " " embankment at	13	4,270 63
7,171 " " solid rock.	60	4,302 60
Bridge No. 44.		3,954 25
Culvert No. 59, 286 perches at	$2 90	829 40
" " 60, 138, " "	3 00	414 00
Drain No. 147, 11 " "	1 75	19 25
		$15,931 88

SECTION No. 174.

The principal expense of this section is occasioned by the very heavy embankment which will be necessary. Culvert No. 61, of 8 feet span will be required. The grade for the first 4 chains descends 60 feet per mile, for the next 28 chains 20 feet per mile, and for the remaining distance 60 feet per mile. The grubbing is ordinary.

Grubbing,		$310 00
39,175 cubic yards of common excavation at	11 cents,	4,309 25
114,299 " " embankment at	13	14,858 87
11,418 " " solid rock at	60	6,850 80
Culvert No 61, 268 perches at	$2 90	777 20
		$27,106 12

SECTION No. 175.

There will be needed some embankment which can be procured adjoining. Bridge No. 45, 60 feet long, and culvert No. 62 of 6 feet span will be necessary. The grubbing extends throughout the section and the grade descends 60 feet per mile.

Grubbing,		$275 00
12,999 cubic yards of common excavation at	12½ cents,	1,559 88
38,671 " " embankment at	14	5,413 94
2,506 " " solid rock at	55	1,378 30
Bridge No. 45,		6,876 00
Culvert 62, 134 perches at	$3 00	402 00
		$15,905 12

SECTION No 176.

Towards the end of this section very deep cutting is encountered, averaging nearly 25 feet for half a mile. Bridge No. 46, 260 feet long will be necessary. The grade descends 60 feet per mile for the first half mile, for the next quarter it descends 30 feet per mile, and for the remaining distance 55 feet per mile. The grubbing is alternately heavy and ordinary throughout.

	Grubbing,		$295 00
109,938	cubic yards of common excavation at	12½ cents,	13,742 25
20,194	“ “ embankment at	10	2,019 40
26,688	“ “ solid rock at	65	18,647 20
	Bridge No. 46,		15,867 00
			$50,570 85

Section No. 177.

This section resembles the preceding one. Culvert No. 63, of 8 feet span, and bridge No. 47, 300 feet long will be required. The grade for the first 28 chains descends 55 feet per mile, for the next 28 chains 30 feet per mile, and for the remainder 55 feet per mile. Ordinary grubbing is necessary throughout.

	Grubbing,		$280 00
77,962	cubic yards of common excavation at	12½ cents,	9,745 25
22,494	“ “ embankment at	10	2,249 40
48,820	“ “ detached rock at	50	24,410 00
	Bridge No. 47,		17,187 00
	Culvert 63, 254 perches at	$3 00	762 00
			$54,633 65

Section No. 178.

The cost of this section will be inconsiderable, the cuttings and fillings being light. Culvert No. 64 of 6 feet span will be required. Ordinary grubbing continues throughout and the grade descends 55 feet per mile.

	Grubbing,		$275 00
5,920	cubic yards of common excavation at	11 cents,	651 20
11,613	“ “ embankment at	10	1,161 30
3,240	“ “ detached rock at	45	1,458 00
	Culvert No. 64, 62 perches at	$3 00	186 00
			$3,731 50

Section No. 179.

The embankment on this section exceeds the excavation, but the excess can be obtained at little expense. The grade descends 55 feet per mile. Culvert 65, of 6 feet span, as well as ordinary grubbing will be required,

	Grubbing,		$310 00
9,266	cubic yards of common excavation at	12 cents,	1,111 92
21,491	“ “ embankment at	14	3,008 74
4,755	“ “ detached rock at	45	2,139 75
479	“ “ solid at	60	287 40
	Culvert No. 65, 78 perches at	$2 90	226 20
			$7,084 01

SECTION No. 180.

As this section is composed mostly of heavy embankment and very litte cutting, the excess of embankment must be furnished at some additional expense. The grade descends 55 feet per mile, and the grubbing continues throughout.

	Grubbing,				$300 00
4,679	cubic yards of	common excavation at	11 cents,		514 69
117,701	"	" embankment at	16		18,832 16
1,104	"	" detached rock at	45		496 80
695	"	" solid "	55		382 25
					$20,525 90

SECTION No. 181.

Still the quantity of embankment is great and therefore somewhat expensive. Bridge No. 48, 80 feet long will be required. The grade descends 55 feet per mile and the grubbing is heavy.

	Grubbing,			$360 00
17,064	cubic yards of	common excavation at	12½ cents,	2,133 00
72,476	"	" embankment at	14	10,146 64
4,808	"	" detached rock at	50	2,404 00
3,324	"	" solid "	60	1,994 40
	Bridge No. 48,			10,616 25
				$27,654 29

SECTION No. 182.

Heavy embankment and deep cutting, the former averaging 35 feet for one-eighth of a mile, and the latter 30 feet for one-fourth of a mile, will be required. Bridge No. 49, 264 feet long will be necessary. The grade still descends 55 feet per mile, and the grubbing is heavy.

	Grubbing,			$370 00
105,708	cubic yards of	common excavation at	12½ cts.	13,213 50
177,871	"	" embankment at	14	24,901 94
31,755	"	" detached rock at	50	15,877 50
17,203	"	" solid "	70	12,042 10
	Bridge No. 49,			25,144 00
				$91,549 04

SECTION No. 183.

This mile is located on very favorable ground. Culvert No. 66 of 6 feet span will be necessary. The grade for the first quarter descends 55 feet per mile, and for the remaining distance 60 feet per mile. The grubbing is ordinary.

	Grubbing,			$275,00
12,278	cubic yards of	common excavation at	10 cents,	1,227 80
19,230	"	" embankment at	11	2,115 30

2,305	" " slate at	25	576 25
1,234	" " solid rock at	55	678 70
	Culvert No. 66, 180 perches at	$3 00	540 00
			$5,413 05

Section No. 184.

This section consists principally of excavation. Culvert No. 67, of 6 feet span will be necessary. The grade for the first 24 chains descends 60 feet per mile, and for the remaining distance 55 feet per mile. The grubbing is ordinary.

	Grubbing,		$275 00
59,463	cubic yards of common excavation at	11 cents,	6,540 93
10,932	" " embankment at	10	1,093 20
9,521	" " slate at	25	2,380 25
10,650	" " solid rock at	60	6,390 00
	Culvert No. 67, 180 perches at	$3 00	540 00
			$17,219 38

Section No. 185.

This first half of this section consists of light excavation, and on the remaining half the embankment is heavy. The grade for the first quarter descends 55 feet per mile, and for the remaining distance 60 feet per mile. Culvert No. 68 of 6 feet span will be required.—The grubbing continues throughout.

	Grubbing,		$200 00
17,046	cubic yards of common excavation at	12 cents,	2,045 52
57.115	" " embankment at	14	7,996 10
2,274	" " detached rock at	50	1,137 00
2,967	" " solid "	60	1,780 20
	Culvert No. 68, 195 perches at	$2 90	565 50
			$13,724 32

Section No. 186.

The expense attending the construction of this section will be very considerable, as it will be nearly entirely composed of high embankment. For the first 16 chains the grade descends 60 feet per mile, and for the remaining distance 46 feet per mile. Drain No. 148, and forty chains of grubbing will be required.

	Grubbing,		$135 00
3,826	cubic yards of common excavation at	12½ cents,	478 25
179,319	" " embankment at	20	35,863 80
2,120	" " slate at	25	530 00
	Drain No. 248, 48 perches at	$1 50	72 00
			$37,079 05

Section No. 187.

The ground occupied by this section is very unfavorable. Drain No. 149 will be required. For the first seven stations the grade descends 46 feet per mile, the remainder of the section descends 60 feet per mile. Half the section will require grubbing.

Grubbing,			$105 00
94,828 cubic yards of	common excavation at	12½ cents,	11,853 50
144,132 " "	embankment	15	21,619 80
2,011 " "	slate at	25	502 75
21,329 " "	solid rock at	65	13,863 85
Drain No. 149, 65 perches at		$1 50	97 50
			$48,042 40

Section No. 188.

The middle of this section is in Laughlinstown. It consists principally of embankment. Two houses must be removed and bridge No. 50, 150 feet long must be built. The grade descends 60 feet per mile.

23,977 cubic yards of	common excavation at	11 cents,	$2,637 47
118,252 " "	embankment at	14	16,555 28
5,456 " "	slate at	25	1,364 00
2,816 " "	solid rock at	60	1,689 60
Bridge No. 50,			9,909 00
For the removal of two houses,			700 00
			$32,855 35

Section No. 189.

This section commences and terminates with embankment, the excavation in the middle being 25 feet deep. Drains No. 150, 151, and 152 will be necessary. The grade is similar to that of the preceding section, and the grubbing will be ordinary for half of the extent of this.

Grubbing,			$165 00
53,168 cubic yards of	common excavation at	11 cents,	5,848 48
215, 80 " "	embankment at	18	38 804 40
5.745 " "	slate at	25	1,436 25
11,077 " "	solid rock at	60	6,646 20
Drains No. 150, 151 & 152, 146 p's		$1 50	219 00
			$53,119 33

Section No. 190.

This section is located along the bank of the Loyalhanna creek and comprises some heavy cutting sand fillings. Culvert No. 60 of 4 feet span will be necessary. The grade for the first quarter of a mile descends 60 feet per mile, for the next 8 chains is level, and for o remainder of the section descends 40 feet per mile. The grubing is light throughout.

	Grubbing,		$75 00
8,410	cubic yards of common excavation at	10 cents,	4,841 00
3,097	" " embankment at	12½	10,387 00
5,295	" " slate at	25	1,323 75
0,640	" " solid rock at	62½	6,650 00
	Culvert No. 69, 102 perches at	$2 90	295 80
			$23,572 53

SECTION No. 191.

Still following the Loyalhanna creek for part of the distance, and e Stoystown and Ligonier turnpike for the remainder, this section rminates at the south-western end of Ligonier. The grade descends 0 feet per mile. Drains No. 153 & 154, one double and one single, ill be required. The grubbing covers two stations.

	Grubbing,		$20 00
44,170	cubic yards of common excavation at	11 cents.	4,858 70
09,201	" " embankment at	16	17,472 16
3,260	" " slate at	25	815 00
14,640	" " solid rock	60	8,184 00
	Drains No. 153 & 154, 78 perches at	$1 50	118 50
			$31,468 36

SECTION No. 192.

The ground occupied by this section is generally even. Bridge No. 1, 40 feet long across Mill creek, and drains No. 155, 156. and 157, ill be necessary. The grade for half a mile descends 34 feet per ile, and for the remaining distance 10.2 feet per mile. There are 6 chains of grubbing.

	Grubbing		$40 00
3,108	cubic yards of common excavation at	9 cents,	279 72
3,164	" " embankment at	13	5,611 32
1,350	" " slate at	25	337 50
	Bridge No. 51,		1,287 50
	Drains No. 155, 156 & 157 p's. at	$1 50	60 00
			$7,616 04

SECTION No. 193.

No deep cutting or heavy embankment occurs. Bridge No. 52, 40 et long, and drains No. 158 & 159 will be necessary. For the first 3 stations the grade descends 6 feet per mile, from thence it ascends 6 feet per mile to the end. Ordinary grubbing continues throughout.

	Grubbing,		$285 00
3,639	cubic yards of common excavation at	9 cents,	327 51
7,646	" " embankment at	12½	3,455 75

Bridge No. 52,		1,341 50
Drains No. 158 & 159, 31 perches at	$1 50	46 50
		$5,456 26

SECTION No. 194.

This section commences and ends with embankment, the excavation between will suffice however to make it. Bridge No. 53, 10 feet long, and a vertical wall for a short distance to protect the bank will be required. The grubbing is ordinary. The grade ascends for the first seven stations, 26 feet per mile, and descends for the remaining distance 24 feet per mile. The curvature is abrupt.

Grubbing,		$200 00
49,727 cubic yards of common excavation at	10 cents,	4,972 70
32,820 " " embankment	11	3,610 20
Bridge No. 53.		148 50
2,536 perches in vertical wall at	$1 20	3,043 20
		$11,974 60

SECTION No. 195.

There will be more embankment than excavation on this section, but the surplus can be easily obtained. Drains No. 160 & 161 will be necessary. The grade descends 24 feet per mile for the first 28 chains and 17 feet for the remainder of the section. The grubbing is light throughout and the curvature is easy.

Grubbing,		$196 00
15,872 cubic yards of common excavation at	10 cents,	1,587 20
59,138 " " embankment at	14	8,279 32
Drains No. 160 and 161, 30 perches at	$1 50	45 00
		$10,107 52

SECTION No. 196.

This section is similar to the preceding one. Drain No. 162 will be necessary. The grade descends 31 feet per mile. The grubbing will be heavy and the curvature easy.

Grubbing,		$340 00
15,299 cubic yards of common excavation at	12 cents,	1,835 88
38,419 " " embankment at	13	4,994 47
5,783 " " detached rock at	45	2,602 35
3,504 " " solid "	60	2,102 40
Drain No. 162, 21 perches at	$1 50	31 50
		$11,906 60

SECTION No. 197.

This section follows the bank of the Loyalhanna creek. The excavation is light and chiefly detached rock. The grade is similar to that of the preceding section, and the grubbing is moderate. Rock run is crossed by culvert No. 70, of 6 feet span. The curvature is abrupt.

	Grubbing,		$180 00
514	cubic yards of common excavation at	10 cents,	51 40
39,764	" " embankment at	15	5,964 60
13,021	" " detached rock at	50	6,510 50
	Culvert No. 70, 128 perches at	$3 00	384 00
			$13,090 50

Section No. 198.

This section still continues down the Loyalhanna with easy excavations and embankments. The grubbing is ordinary. The grade for the first 16 chains descends 31 feet per mile, and for the remaining distance 17 feet per mile. The curvature is easy.

	Grubbing,		$218 00
7,951	cubic yards of common excavation at	11 cents,	874 61
19,040	" " embankment at	12½	2,380 00
3,550	" " detached rock at	45	1,597 50
3,268	" " solid "	55	1,797 40
			$6,867 51

Section No. 199.

To grade this section will cost very little. Drain No, 162 will be necessary. The grade descends 17 feet per mile and the curvature is easy. The grubbing extends 18 chains.

	Grubbing,		$22 50
5,475	cubic yards of common excavation at	10 cents,	547 50
18,772	" " embankment at	12	2,252 64
	Drain No. 162, 19 perches at	$1 75	33 25
			$2,855 89

Section No. 200.

Still pursuing the Loyalhanna creek, with very light cutting and no heavy filling, a level is introduced for the first half mile, for the balance the grade descends 12 feet per mile. Culverts No. 71 & 72 of 4 feet span each, and moderate grubbing are required. The curvature is easy.

	Grubbing,		$110 00
14,146	cubic yards of common excavation at	10 cents,	1,414 60
21,514	" " embankment at	12½	2,689 25
	Culverts No. 71 & 72, 141 perches at	$3 00	423 00
			$4,636 85

Section No. 201.

Crossing the Loyalhanna about the middle of the section, where bridge No. 54, 170 feet long will be required, the ground ascends very rapidly. For the first half mile the grade descends 12 feet per mile, and for the remaining half ascends 48.2 feet per mile. Twenty chains of grubbing will be necessary.

Grubbing,		$65 00
18,791 cubic yards of common excavation at	10 cents,	1,879 10
78,471 " " embankment at	16	12,555 36
5,186 " " solid rock at	62½	3,241 25
Bridge No. 54,		10,869 00
		$28,629 71

Section No. 202.

This section is situated one mile to the right of Youngstown.—Bridge No. 55, 40 feet long is necessary over 14 mile run. The grade ascends 48.2 feet per mile, and ten stations of grubbing are required. The curvature is easy.

Grubbing,		$150 00
18,164 cubic yards of common excavation at	11 cents,	1,998 04
131,934 " " embankment at	20	26,386 80
5,670 " " slate at	25	1,417 50
Bridge No. 55,		3,653 50
		$33,605 84

Section No. 203.

This section passes over ground which rises with great rapidity. Drain No. 163 will be necessary. The grade ascends 48.2 feet per mile. The curvature is easy.

Grubbing,		$80 00
11,068 cubic yards of common excavation at	10 cents,	1,106 80
24,633 " " embankment at	13	3,202 29
3,278 " " slate at	25	819 50
Drain No, 163, 25 perches at	$1 50	37 50
		$5,246 09

Section No. 204.

This section still rises at the rate of 48.2 feet per mile, but requires no expensive work. Drain No. 164 will be necessary. The grubbing is light and the curvature easy.

Grubbing,		$20 00
42,018 cubic yards of common excavation at	10 cents,	4,201 80
13,647 " " embankment at	11	1,501 17
Drain No. 164, 25 perches at	$1 50	37 50
		$5,760 47

Section No. 205.

This section commences with light excavation and terminates with deep excavation, some embankment will occupy the middle of the section. Drain No. 165 will be required. The grade ascends 48.2 feet per mile, and eight chains of grubbing will be required.

	Grubbing,		$30 00
28,615	cubic yards of common excavation at	12 cents,	3,433 80
137,553	“ “ embankment at	13	17,881 89
12,055	“ “ slate at	25	3,013 75
8,726	“ “ solid rock at	62½	5,453 75
	Drain No. 165, 27 perches at	$1 50	40 50
			$29,853 69

SECTION No. 206.

The grade ascends for the first four chains 48.2 feet per mile, a level is then introduced, which continues 8 chains, and from thence the grade descends 40 feet per mile. Markle's summit is attained where the cutting is deep. There will also be much deep embankment necessary. Culvert No. 73 of 6 feet span, and drain No. 166 will be required.

80,049	cubic yards of common excavation at	12 cents,	$9,605 88
392,646	“ “ embankment at	18	70,676 28
41,976	“ “ solid rock at	70	29,383 20
	Culvert No. 73; 275 perches at	$3 25	893 75
	Drain No. 166, 107 “	1 75	187 25
			$110,746 36

SECTION No. 207.

The embankment on this section will exceed the excavation; the excess must be obtained elsewhere. The grade for the first 8 chains descends 40 feet per mile, and for the remainder of the section 20.84 feet per mile. Culvert No. 74 of 4 feet span, and drains No. 167 and 168 will be required. The grubbing will be light and the curvature abrupt.

	Grubbing,		$220 00
35,376	cubic yards of common excavation at	11 cents,	3,891 36
110,281	“ “ embankment at	15	16,542 15
21,218	“ “ solid rock at	62½	13,261 27
	Culvert No. 74, 102 perches at	$3 00	306 00
	Drains No. 167 and 168, 84 at	1 62½	136 50
			$34,337 28

SECTION No. 208.

Half of this section is deep excavation, averaging about 20 feet. This excavation contains a large quantity of rock. The curvature is light and the grade descends 50 feet per mile, Twenty eight chains of grubbing will be required.

	Grubbing,		$140 00
98,272	cubic yards of common excavation at	12½ cents,	12,284 00

9,376	“ “ embankment at	10	937 60
22,747	“ “ solid rock at	65	14,785 55
			$28,147 15

SECTION No. 209.

This section descends 50 feet per mile, and is composed almost entirely of heavy embankment. Culvert No. 75 of 6 feet span, and drain No. 169 will be necessary. The grubbing is ordinary and the curvature is easy.

	Grubbing,		$150 00
1,471	cubic yards of common excavation at	10 cents,	147 10
202,615	“ “ embankment at	20	40,523 00
	Culvert No. 75, 283 perches at	$3 00	849 00
	Drain No. 169, 32 “ “	1 50	48 00
			$41,717 10

SECTION No. 210.

This section is undulating requiring both heavy embankments and deep excavations. The grade for the first three-fourths of a mile descends 12 feet per mile, and for the last fourth ascends 48 feet per mile. Culvert No 76 of 4 feet span, and drain No. 170 will be necessary. The curvature is easy.

	Grubbing,		$5 00
43,768	cubic yards of common excavation at	12½ cents,	5,471 00
202,248	“ “ embankment at	17	34,382 16
18,560	“ “ solid rock at	62½	11,600 00
	Culvert No. 76, 128 perches at	$3 00	384 00
	Drain No. 170, 37 at	1 50	55 50
			$51,897 66

SECTION No. 211.

This section passes over a hilly country and consists of very high embankment with some little deep cutting. Culvert No. 77, of 4 feet span, and drain No. 171 will be required. The grade ascends 48 feet per mile, and the curvature is abrupt.

	Grubbing,		$5 00
36,482	cubic yards of common excavation at	12 cents,	4,377 84
251,035	“ “ embankment at	15	37,655 25
23,987	“ “ solid rock at	65	15,591 55
	Culvert No. 77, 141 perches at	$3 25	458 25
	Drain No. 171. 41 perches at	1 75	71 75
			$58,159 64

SECTION No. 212.

All this section, with the exception of the last 4 chains which are level, ascends 50 feet per mile. Barclay's summit is reached. The last fourth of the section is a cut averaging 30 feet deep. Ten stations of heavy grubbing, and drains No. 172 and 173 will be required. The curvature is abrupt.

	Grubbing,		$180 00
62,626	cubic yards of common excavation at	12½ cents,	7,828 25
117,720	“ “ embankment at	14	16,480 80
29,563	“ “ solid rock at	62½	18,476 25
45,214	“ “ slate at	25	11,303 50
	Drains No. 172 & 173, 81 perches	$1 75	141 75
			$54,410 55

Section No. 213.

This section descends from Barclay's summit at the rate of 50 feet per mile, with the exception of the first four chains which are level. Two-thirds of this section will be excavation and the first fourth of it will average 25 feet cutting. The curvature is easy.

	Grubbing,		$5 00
89,760	cubic yards of common excavation at	12½ cents,	11,220 00
8,340	“ “ embankment at	10	834 00
31,750	“ “ solid rock at	70	22,225 00
24,190	“ “ slate at	28	6,773 20
			$41,057 20

Section No. 214.

This section is composed of moderate excavation and embankment and crosses Brush creek by bridge No. 56, 15 feet long. One-fourth of it will require grubbing and the grade will descend 50 feet per mile. The curvature is easy.

	Grubbing,		$50 00
12,307	cubic yards of common excavation at	10 cents,	1,230 70
16,486	“ “ embankment at	11	1,813 46
8,279	“ “ solid rock at	55	4,553 45
	Bridge No. 56,		1,516 50
			$9,164 11

Section No. 215.

This section occupies ground that will require an immense quantity of embankment. Bridge No. 57, 20 feet long will be required over Brush creek, and bridge No. 58, 10 feet long, over a branch of the same creek. The curvature is moderate and the grade descends 50 feet per mile. Some grubbing and drain No. 174 will be necessary.

	Grubbing,		$70 00
7,896	cubic yards of common excavation at	10 cents,	789 60
345,186	“ “ embankment at	20	69,037 20
2,876	“ “ solid rock at	60	1,725 60

Bridge No. 57 and 58,			10,794 50
Drain " 174, 57 perches at		$2 00	114 00
			$82,530 90

SECTION No. 216.

This section follows the valley of Brush creek, and about the middle of it crosses the creek by bridge No. 59, 50 feet long. The first half of this section is entirely embankment. Culvert No. 78 of 4 feet span, and drain No. 175 will be required. The grade, with the exception of the last four chains which are level, descends 40 feet per mile.

	Grubbing,		$85 00
8,335	cubic yards of common excavation at	10 cents,	833 50
290,851	" " embankment at	18	52,353 18
2,468	" " solid rock at	55	1,357 40
	Bridge No. 59,		2,902 00
	Culv't " 78, 80 perches at	$2 90	232 00
	Drain " 175, 70 "	1 75	122 50
			$57,885 58

SECTION No. 217.

Continuing the valley of Brush creek this section will not be so expensive. Drains No. 176, 177 and 178, as also 28 chains of grubbing will be necessary. The first four chains are level, the grade then ascends 27 feet per mile for 13 stations, the next 8 chains are level and the balance descends 44 feet per mile.

	Grubbing,		$140 00
35,328	cubic yards of common excavation at	12½ cents,	4,416 00
46,253	" " embankment at	13	6,012 89
34,768	" " slate at	25	8,692 00
14,770	" " solid rock at	62½	9,231 25
	Drains No. 176 and 177, 59 perches at	$1 50	88 50
			$28,580 64

SECTION No. 218.

Bridges No. 60 and 61, the former 400 feet long over a mill dam, and the latter 60 feet long will be required where the line crosses Brush creek. Bridge No. 62, 15 feet long will also be needed over a mill race. The grade descends 44 feet per mile for three-fourths of the section and 37 feet per mile for the remainder. 32 chains of ordinary grubbing will be necessary.

	Grubbing,		$136 60
29,272	cubic yards of common excavation at	11 cents,	3,219 92
71,440	" " embankment at	16	11,430 40
10,350	" " detached rock at	50	5,175 00

Bridge No. 60,	17,719 87
" " 61,	1,0 6 25
" " 62,	5,358 00
	$44,045 44

SECTION No. 219.

This section follows the valley of Brush creek, and near its end crosses it by bridge No. 63, 90 feet long. The greater part of this section is embankment. Drains No. 178 and 179 are necessary. There will be 16 chains of heavy grubbing, and the curvature will be easy.

Grubbing,			$80 00
8,760 cubic yards of common excavation at	10 cents,		876 00
81,134 " " embankment at	16		12,981 44
856 " " solid rock at	60		513 60
Bridge No. 63,			4,425 00
Drains No. 178 and 179, 56 ps at	$1 50		84 00
			$18,960 04

SECTION No. 220.

This section will involve some heavy embankment and deep cutting. Bridges No. 64 and 65 will be required over Brush creek; the former 100 feet, and the latter 150 feet long. Culvert No. 79 will also be required. The grade ascends 8 feet per mile, and half of the section will require grubbing. The curvature is easy.

Grubbing,		$180 00
27,703 cubic yards of common excavation at	11 cents,	3,053 93
180,335 " " embankment at	17	30,656 95
12,525 " " solid rock at	60	7,515 00
Bridges No. 64 and 65,		19,710 00
Culvert No. 79, 128 perches at	$3 25	416 00
		$61,531 88

SECTION No. 221.

The commencement of this section is in deep cutting. On the latter part of the section Brush creek is crossed by bridges No. 66, 67 and 68, and a mill race by bridge No. 69. The grade ascends 8 feet per mile for the first fourth of a mile, and for the remainder descends 50 feet per mile. The curvature is abrupt.

Grubbing,		150 00
135,270 cubic yards of common excavation at	13 cents,	$17,585 10
103,572 " " embankment at	14	14,500 08
44,624 " " solid rock at	62½	27,890 00
Bridges No. 66, 67 and 68,		33,960 00
Bridge No. 69,		4,026 00
		$98,111 18

SECTION No. 222.

In the middle of this section 16 chains of heavy cutting occur, averaging 35 feet. The remainder is embankment. Bridge No. 70, 150 feet long, and culvert No. 80, of 6 feet span, as well as drains No. 180 and 181 will be required. The grade for the first quarter descends 50 feet per mile, and for the remainder of the section 30 feet per mile. Eleven stations of grubbing are necessary, and the curvature is slight.

Grubbing,		$125 00
71,110 cubic yards of common excavation at	12½ cents,	8,888 75
151,612 " " embankment at	17	25,774 04
14,977 " " solid rock at	65	9,735 05
Bridge No. 70,		9,832 00
Culvert No. 80, 206 perches at	$3 00	618 00
Drains No. 180 and 181, 42 ps at	1 50	63 00
		$55,035 84

SECTION No. 223.

Some deep cutting will occur during this section. Brush creek is crossed by bridge No. 71, 264 feet long. Culvert 81, of 4 feet span, and drain No. 182 will be necessary. The first fourth of this section has a descending grade of 30 feet per mile, and the remainder an ascending grade of 10 feet per mile. The grubbing is ordinary and the curvature easy.

Grubbing,		$200 00
137,772 cubic yards of common excavation at	13 cents,	17,910 36
61,465 " " embankment at	12	7,375 80
21,456 " " solid rock at	65	13,946 40
Bridge No. 71,		12,666 00
Culvert 81, 99 perches at	$2 90	287 10
Drain No. 182, 13 perches at	1 50	19 50
		$52,405 16

SECTION No. 224.

This section occupies uneven ground. Bridge No. 172, 130 feet long over Brush creek, and drains No. 183 and 184 will be required. The first fourth of a mile ascends 10 feet per mile and the remaining distance descends 40 feet per mile. The grubbing is ordinary and the curvature abrupt.

Grubbing,		$285 00
58,565 cubic yards of common excavation at	12 cents,	7,027 80
79,552 " " embankment at	13	10,341 76
14,734 " " solid rock at	60	8,840 40
Bridge No. 72,		15,519 00
Drains No. 183 and 184, 70 ps at	$1 75	122 50
		$42,136 46

SECTION No. 225.

The line still follows Brush creek valley and crosses Turtle creek at its junction with Brush creek by bridge No. 73, 100 feet long. Drains No. 185 and 186 will be required. The grade descends 40 feet per mile. The grubbing is light and the curvature easy.

Grubbing,		$60 00
35,327 cubic yards of common excavation at	11 cents,	3,885 97
93,435 " " embankment at	13	12,146 55
15,357 " " solid rock at	60	9,214 20
13,320 " " slate at	25	3,330 00
Bridge No. 73,		6,457 00
Drains No. 185 & 186, 45 perches at $1 50		67 50
		$35,161 22

SECTION No. 226.

This section begins with deep excavation and ends with embankment. Bridges No. 74 and 75, 130 and 200 feet long respectively, and drain No. 187 are necessary. The grade descends 40 feet per mile for the first quarter, and 11 feet per mile for the remainder of the distance. There will be 20 chains of heavy grubbing and the curvature is easy.

Grubbing,		$100 00
25,860 cubic yards of common excavation at	11 cents,	2,844 60
28,404 " " embankment at	14	3,976 56
9,635 " " solid rock at	60	5,781 00
Bridges No. 74 and 75,		11,387 50
Drain No. 187, 13 perches at	$1 50	19 50
		$24,109 16

SECTION No. 227.

At least two-thirds of this section is embankment. Drains No 188 and 189 are necessary. The grade descends 11 feet per mile and the grubbing continues throughout. The curvature is abrupt.

Grubbing,		$200 00
15,318 cubic yards of common excavation at	12 cents,	1,838 16
30,234 " " embankment at	14	4,232 76
3,287 " " solid rock at	60	1,972 20
Drains No. 188 & 189, 36 perches at	$1 50	54 00
		$8,297 12

SECTION No. 228.

This section follows Turtle creek; three-fourths of it is level and the grade descends 28 feet per mile for the remaining distance. The grubbing is ordinary and the curvature easy.

Grubbing,		$245 00
35,048 cubic yards of common excavation at	12½ cents,	4,381 00
25,855 " " embankment at	11	2,844 05

9,780 “	“ solid rock at	62½	6,112 50
	Drain No. 190, 13 perches at	$1 50	19 50
			$13,602 05

SECTION No. 229.

This section is located on favorable ground. Bridge No. 76, 120 feet long over Thompson's run, and drain No. 191 will be necessary. The grade descends 28 feet per mile for the first half mile, and the remaining half is level. The curvature is easy.

5,318	cubic yards of common excavation at	10 cents,	$531 80
7,253 “	“ embankment at	11	797 83
1,575 “	“ solid rock at	55	866 25
	Bridge No. 76,		2,112 50
	Drain No. 191, 15 perches at	$1 50	22 50
			$4,330 88

SECTION No. 230.

Near the end of this section a deep cut averaging 40 feet deep and 16 chains long, is encountered. The grade ascends 16 feet per mile, and 8 chains of light grubbing occur. The curvature is abrupt.

	Grubbing,		$10 00
48,756	cubic yards of common excavation at	13 cents,	6,338 28
24,756 “	“ embankment at	10	2,475 60
22,822 “	“ solid rock at	65	14,834 30
			$23,658 18

SECTION No. 231.

The embankment of this section exceeds the excavation, but the excess can be easily obtained adjoining. Drains No. 192, 193 and 194 will be necessary. The grade ascends 16 feet per mile. The grubbing is light and the curvature easy.

	Grubbing,		$10 00
15,820	cubic yards of common excavation at	10 cents,	1,582 00
147,377 “	“ embankment at	15	22,106 55
1,760 “	“ solid rock at	60	1,056 00
	Drains No. 192, 193 & 194, 142 p's	$1 80	255 60
			$25,010 15

SECTION No. 232.

This section will be very cheap, the excavation and embankment being light. The grade descends 10 feet per mile. 16 chains of heavy grubbing will be necessary. The curvature is easy.

	Grubbing,		$80 00
9,621	cubic yards of common excavation at	10 cents,	962 10
11,729 “	“ embankment at	11	1,290 19
1,658 “	“ solid rock at	60	994 80
			$3,327 09

SECTION No. 233.

The commencement and termination of this section will be easy embankment, with excavation occupying the intermediate space.—Drains No. 195 and 196 will be necessary. The first half mile descends 10 feet per mile, and the remainder descends 20 feet per mile. The curvature is light.

18,320	cubic yards of common excavation at	10 cents,	1,832 00
19,171	" " embankment at	11	2,108 81
4,370	" " solid rock at	60	2,622 00
	Drains No. 195 and 196, 47 perches at	$1 50	70 50
			$6,633 31

SECTION No. 234.

This section reaches the Monongahela river and follows that stream. The first half is level, and the balance descends 20 feet per mile. Drain No. 197, as well as 20 chains of light grubbing are necessary. The curvature is easy.

	Grubbing,		$25 00
8,972	cubic yards of common excavation at	10 cents,	897 20
26,662	" " embankment at	12	3,199 44
4,876	" " solid rock at	60	2,925 60
	Drain No. 197, 15 perches at	$1 50	22 50
			$7,069 74

SECTION No. 235.

Following the same stream little expense will attend the construction of this section. Bridge No. 77, 80 feet long will be necessary, as also ordinary grubbing. The grade ascends 10 feet per mile for the first quarter, and is level for the balance of the section. The curvature is easy.

	Grubbing,		$250 00
5,109	cubic yards of common excavation at	10 cents,	510 90
9,965	" " embankment at	11	1,096 15
620	" " solid rock at	55	341 00
	Bridge No. 77,		2,433 75
			$4,631 80

SECTION No. 236.

This section is composed of more embankment than excavation and continues along the Monongahela river. Culvert No. 82, of 4 feet span will be necessary. The grade ascends 8 feet per mile for three-fourths of the section, and 40 feet per mile for the remainder. The grubbing is ordinary and the curvature easy.

	Grubbing,		$200 00
7,150	cubic yards of common excavation at	10 cents,	715 00
56,269	" " embankment at	16	9,003 04

525	" " solid rock at	60	315 00
	Culvert No. 82, 95 perches at	$3 00	285 00
			$10,518 04

SECTION No. 237.

The location of this section is over ascending ground and the grade ascends 40 feet per mile for the first three-fourths, and is level for the remainder of the section. Drain No. 198 and 4 chains of ordinary grubbing will be required. The curvature is abrupt.

	Grubbing,		$12 00
25,241	cubic yards of common excavation at	11 cents,	2,776 51
10,052	" " embankment at	10	1,005 20
7,218	" " solid rock at	60	4,330 80
	Drain No. 198, 25 perches at	$1 50	37 50
			$8,162 01

SECTION No. 238.

Still continuing down the river, the majority of this section is excavation. The first half mile is level and the remainder descends 35 feet per mile. The curvature is easy.

33,256	cubic yards of common excavation at	12 cents,	$3,990 72
9,162	" " embankment at	10	916 20
10,220	" " solid rock at	60	6,132 00
			$11,038 92

SECTION No. 239.

This section commences with heavy embankment. The grade for the first fourth of a mile descends 35 feet per mile, the remainder descends 10 feet per mile. Bridge No. 78, 50 feet long, and drain No. 199 will be necessary. The curvature is easy.

12,980	cubic yards of common excavation at	11 cents,	$1,427 80
66,257	" " embankment at	17	11,263 69
2,598	" " solid rock at	60	1,558 80
	Bridge No. 78		7,324 00
	Drain " 199, 38 perches at	$1 50	57 00
			$21,631 29

SECTION No. 240.

This section passes along near the Monongahela river. Included within its limits is 42 chains of the 141st mile which is located in Second street, Pittsburg, and terminates at the Pennsylvania canal bridge in the same street. The whole of this section is moderate excavation and embankment, with the exception of its last quarter, where some deep cutting is encountered. Drains No. 200 and 201 will be necessary. The first half mile is level and the remainder ascends 25 feet per mile, excepting 42 chains which descend 12 feet per mile. A few chains of vertical wall will be necessary. The curvature is easy.

42,460	cubic yards of common excavation at	11 cents,		4,670 60
31,789	" " embankment at	12		3,814 68
14,218	" " solid rock at	60		8,530 80
	Drains No. 200 and 201, 36 perches at	$1 75		63 00
7,050	perches in vertical wall at	1 25		8,812 50
				$25,891 58

RECAPITULATION.

ESTIMATED COST OF		ESTIMATED COST OF	
Section No. 6,	$130 23	Section No. 52,	7,206 46
" " 7,	10,270 71	" " 53,	5,435 54
" " 8,	18,848 04	" " 54,	6,763 64
" " 9,	7,638 10	" " 55,	1,794 98
" " 10,	6,281 42	" " 56,	1,538 58
" " 11,	4,503 22	" " 57,	2,078 30
" " 12,	2,638 08	" " 58,	8,870 31
" " 13,	7,721 40	" " 59,	21,009 20
" " 14,	9,730 74	" " 60,	17,044 19
" " 15,	3,019 65	" " 61,	9,471 94
" " 16,	4,642 97	" " 62,	51,470 02
" " 17,	7,062 00	" " 63,	142,241 42
" " 18,	27,950 51	" " 64,	31,353 58
" " 19,	27,509 42	" " 65,	14,458 32
" " 20,	52,779 62	" " 66,	120,020 84
" " 21,	34,035 01	" " 67,	44,462 40
" " 22,	5,862 40	" " 68,	5,142 90
" " 23,	15,750 80	" " 69,	19,882 44
" " 24,	13,618 60	" " 70,	24,590 60
" " 25,	28,238 84	" " 71,	15,414 38
" " 26,	21,419 74	" " 72,	39,278 32
" " 27,	21,798 18	" " 73,	114,741 47
" " 28,	35,179 08	" " 74,	18,041 54
" " 29,	67,429 74	" " 75,	55,360 86
" " 30,	96,698 05	" " 76,	16,520 78
" " 31,	10,881 15	" " 77,	21,425 66
" " 32,	4,921 78	" " 78,	107,668 08
" " 33,	3,264 48	" " 79,	10,984 80
" " 34,	2,089 36	" " 80,	11,581 40
" " 35,	2,616 94	" " 81,	7,304 90
" " 36,	2.664 66	" " 82,	5,977 00
" " 37,	3,044 66	" " 83,	50,389 75
" " 38,	8.876 35	" " 84,	13,462 40
" " 39,	3,438 69	" " 85,	4,145 10
" " 40,	2,574 30	" " 86,	4,706 30
" " 41,	13,476 36	" " 87,	6,503 76
" " 42,	3,910 20	" " 88,	2,127 94
" " 43,	4,212 70	" " 89,	18,917 72
" " 44,	10,626 84	" " 90,	10,584 48
" " 45,	1,934 58	" " 91,	1,446 02
" " 46,	13,207 42	" " 92,	8,382 77
" " 47,	20,833 40	" " 93,	13.164 40
" " 48	7,001 47	" " 94,	14,282 05
" " 49,	10,255 00	" " 95,	7,907 53
" " 50,	4,898 94	" " 96,	6,330 48
" " 51,	8,652 34	" " 97,	13,056 49

RECAPITULATION.

ESTIMATED COST OF				ESTIMATED COST OF			
Section No.	98	$17,332	46	Section No.	144	$43,389	75
“	99	9,835	02	“	145	69,900	50
“	100	4,122	30	“	146	25,762	75
“	101	10,761	84	“	147	7,623	96
“	102	5,517	82	“	148	25,895	12
“	103	8,544	75	“	149	42,676	81
“	104	120,521	92	“	150	23,788	10
“	105	19,020	47	“	151	52,910	05
“	106	135,044	84	“	152	58,881	75
“	107	12,944	77	“	153	81,383	95
“	108	88,649	35	“	154	17,700	53
“	109	61,809	90	“	155	23,985	35
“	110	63,361	45	“	156	89,698	56
“	111	20,446	75	“	157	7,109	37
“	112	18,741	58	“	158	8,913	98
“	113	78,433	80	“	159	13,764	84
“	114	35,969	35	“	160	10,759	74
“	115	53,207	50	“	161	9,376	28
“	116	11,423	15	“	162	5,613	62
“	117	8,914	71	“	163	15,057	44
“	118	6,540	43	“	164	77,203	03
“	119	95,819	25	“	165	7,475	25
“	120	10,485	45	“	166	15,013	81
“	121	6,764	40	“	167	36,209	11
“	122	8,543	35	“	168	19,792	83
“	123	435,251	98	“	169	64,261	06
“	124	72,791	90	“	170	59,516	00
“	125	12,653	26	“	171	36,705	75
“	126	14,175	05	“	172	7,184	99
“	127	6,784	94	“	173	15,931	88
“	128	13,278	55	“	174	27,106	12
“	129	8,239	83	“	175	15,905	12
“	130	18,378	68	“	176	50,570	85
“	131	45,347	00	“	177	54,633	62
“	132	40,064	50	“	178	3,731	50
“	133	24,332	90	“	179	7,084	01
“	134	17,935	79	“	180	20,525	90
“	135	16,830	15	“	181	27,654	29
“	136	23,939	91	“	182	91,549	04
“	137	31,905	65	“	183	5,413	05
“	138	26,555	75	“	184	17,219	38
“	139	23,056	63	“	185	13,724	32
“	140	26,419	74	“	186	37,079	05
“	141	27,143	71	“	187	48,042	40
“	142	16,987	79	“	188	32,855	35
“	143	26,408	67	“	189	53,119	33

RECAPITULATION.

ESTIMATED COST OF		ESTIMATED COST OF	
Section No. 190	$23,572 55	Section No. 216	57,885 58
" 911	31,468 36	" 217	28,580 64
" 192	7,616 04	" 218	44,045 44
" 193	5,456 26	" 219	18,960 04
" 194	11,974 60	" 220	61,531 88
" 195	10,107 52	" 221	98,111 18
" 196	11,906 60	" 222	55,035 84
" 197	13,090 50	" 223	52,405 10
" 198	6,867 51	" 224	42,136 46
" 199	2,855 89	" 225	35,161 22
" 200	4,636 85	" 226	24,109 16
" 201	28,629 71	" 227	8,297 12
" 202	33,605 84	" 228	13,602 05
" 203	5,246 09	" 229	4,330 88
" 204	5,760 47	" 230	23,658 18
" 205	29,853 69	" 231	25,010 15
" 206	110,746 36	" 232	3,327 09
" 207	34,337 28	" 233	6,633 31
" 208	28,147 15	" 234	7,069 74
" 209	41,717 10	" 235	4,631 80
" 210	51,897 66	" 236	10,518 04
" 211	58,159 64	" 237	8,162 01
" 212	54,410 55	" 238	11,038 92
" 213	41,057 20	" 239	21,631 29
" 214	9,164 11	" 240	25,891 58
" 215	32,530 90		
Total cost of grading 240 miles and 42 chains,			$6,524 415 91

ESTIMATE OF SLACKWATER NAVIGATION ON THE RAYSTOWN BRANCH OF JUNIATA.

Section No. 1.

Commences 200 feet below Hopewell Iron Works. The towing path commences on the left bank of the river and continues on the same side, and will require embankment for its entire formation. The grubbing is light.

11,113 cubic yards of embankment at 9 cents,	$1,000 17
Grubbing,	75 00
	$1,075 17

Section No. 2.

Two-thirds of this section is similar to the preceding one. The latter portion of it has a rough bluff on the towing path side. The grubbing is generally light.

Grubbing,	$100 00
15,066 cubic yards of embankment at 9 cents,	1,355 94
	$1,455 94

Section No. 3.

A rough bluff continues for the first third of a mile, for the remainder of the section the towing path will necessarily be made on a gravelly beach, lying low and requiring much embankment. The grubbing is light. On this section there will be a dam 14.5 feet high and 370 feet long, and a guard lock with a lift of 12 feet. The guard lock will serve as one of the abutments of the dam.

Grubbing,	$75 00
23,574 cubic yards of embankment at 9 cents,	2,121 66
Dam No. 1, $29 72 per foot lineal,	12,499 17
Lock No. 1, 12 feet lift,	14,490 00
	$29,095 83

Section No. 4.

The towing path continues on a low beach for the first half mile, and for that distance the clearing is light, consisting of small bushes. The embankment is heavy on the remainder of the section, and the grubbing on the same will be expensive.

Grubbing,	$100 00
51,522 cubic yards of embankment at 11 cents,	5,667 42
	$5,767 42

Section No. 5.

The towing path continues for one-sixth of a mile when a canal commences. The grubbing ends at that point. The canal is made through a meadow where the ground is favorable. This section contains a dam 18.5 feet high and 528 feet long, a guard lock with a lift of 8 feet and two culverts under the canal one of 4 and the other of 6 feet span. The dam abuts against the guard lock.

Grubbing,	$20 00
6,762 c. yards of embankment in T. path at 11 cents,	743 82
20,650 " " ex. in canal at 10	2,065 00
700 " " embankment at 10	70 00
Dam No. 2, 18.5 feet high,	26,062 74
Lock No. 2, 8 feet lift,	9,600 00
Culvert, 4 feet span, 97.42 p's. at $3 00	292 26
" 6 " " 204 37 " " 3 00	613 11
	$39,466 93

SECTION No. 6.

The canal continues on favourable ground for five-sixths of the section, where it ends, and slack water again commences. A bluff presents itself at the end of the canal. There are two locks on this section, each of 8 feet lift and one culvert of 4 feet span.

53,386 cubic yards of excavation at 10 cents,	$5,338 60
Locks No. 3 and 4, 8 feet lift each,	16,000 00
Culvert 4 feet span, 97.42 perches at $3 00	292 26
	$21,630 86

SECTION No. 7.

The towing path on this section occupies favorable ground, and but little embankment is required. The grubbing is generally light but continues throughout the section,

Grubbing,	$100 00
540 cubic yards of embankment at 9 cents,	48 60
	$148 60

SECTION No. 8.

The towing path continues on favourable ground, and requires but a small quantity of embankment. The grubbing is also very light. This section has within its limits a dam 11.8 high and 290 feet long. and a guard lock with a lift of 10 feet. The dam abuts against the guard lock.

Grubbing,	$20 00
5,046 cubic yards of embankment at 7 cents,	353 22
Dam No. 3, 11.8 feet high,	6,473 00
Lock No. 5, 10 feet lift,	12,000 00
	$18,846 22

SECTION No. 9.

The tow-path along this section will occupy very favorable ground, rendering but a small quantity of embankment necessary. Th grubbing is light but continues throughout most of the section. On this section a dam 9.8 feet high and 396 feet long, and a guard lock with a lift of 8 feet will be required.

Grubbing,	$75 00
5,676 cubic yards of embankment at 8 cents,	454 08
Dam No. 4, 9.8 feet high,	6,310 27
Lock " 6, 8 feet lift	9,600 00
	$16,439 35

SECTION No. 10.

The towing path on this section will be made along Slate bluffs, and will require a large amount of embankment, which on account of some difficulty in obtaining it, will cost more than usual. There will be one square drain and one towing path bridge 15 feet long required. The grubbing is very light.

Grubbing,	$50 00
19,812 cubic yards of embankment at 10 cents,	1,981 20
Square drain,	10 00
Bridge 15 feet long,	55 50
	$2,096 70

SECTION No. 11.

The bank along this section is low and there will be a large quantity of embankment required to form the towing path. This embankment can however be obtained adjoining. The grubbing is very light. A dam 9.7 feet high and 330 feet long, a guard lock with a lift of 8 feet, and one square drain must be built. Stonerstown is situated opposite this section.

Grubbing,	$50 00
20,490 cubic yards of embankment at 10 cents,	2,049 00
Dam No. 5, 9.7 feet high	5,225 73
Lock " 7, 8 feet lift,	9,600 00
Square drain,	12 00
	$16,936 73

SECTION No. 12.

The river bank along this section though generally low, is favorable to the construction of a towing path. Embankment, a large quantity of which will be required, can be easily obtained. The grubbing continues throughout the section. This section requires a dam 13 feet high and 396 feet long, a guard lock with a lift of 8 feet, and a towing path bridge 20 feet long.

Grubbing,	$75 00
28,836 cubic yards of embankment at 8 cents,	2,306 88
Bridge over Sharp's run 20 feet long,	80 50
Dam No. 6, 13 feet high,	9,801 00
Lock " 8, 8 feet lift,	9,600 00
	$21,863 38

Section No. 13.

A canal occupies one half of this section, at the end of which slack water navigation re-commences. Within its limits are a dam 11.8 feet high and 330 feet long, and a guard lock with a lift of 8 feet. The grubbing is light.

Grubbing,	$50 00
31,000 cubic yards of excavation in canal at 10 cents,	3,100 00
1,370 " " emb'kment in towing path at 8 cts.	109 60
Dam No. 7, 11.8 feet high,	7,373 59
Lock " 9, 8 feet lift,	9,600 00
	$20,233 19

Section No. 14.

The bank of the river along this section is unusually well adapted for a towing path, in consequence of which natural advantage, little embankment is required. The grubbing throughout the section is heavy.

Grubbing,	$125 00
9,960 cubic yards of embankment at 8 cents,	796 80
	$921 80

Section No. 15.

The towing path along this section is at the foot of a bluff of slate rock, but to obtain embankment will not be very difficult. The grubbing is light. There will be required a dam 11 feet high and 330 feet long; a guard lock with a lift of 7 feet and one square drain.

Grubbing,	$25 00
8,820 cubic yards of embankment at 8 cents,	705 60
Dam No. 8, 11 feet high,	6,461 90
Lock " 10, 7 feet lift,	8,400 00
Square drain,	12 00
	$15,604 50

Section No. 16.

The towing path for this section will occupy favorable ground, as the embankment required can be easily obtained. The grubbing throughout the entire extent of it will be more than usually heavy. One square drain will be required.

Grubbing,	$150 00
21,066 cubic yards of embankment at 8 cents,	1,685 28
Square drain,	12 00
	$1,847 28

SECTION No. 17.

The towing path occupies but one-third of this section; a canal then commences and continues throughout it. There is some deep cutting which cannot be avoided. The canal will be made on the side of the river opposite to that uniformly occupied by the towing path heretofore, and is so arranged, on account of bluffs presenting themselves on the opposite shore. The substitution of a canal for slackwater navigation is also resorted to here to prevent the injury that would accrue to Clinton forge, on account of the water that would necessarily be backed up by a dam. This renders necessary two towing path bridges over the river and another over the canal. This section contains one dam 13 feet high, and 330 feet long, 1 guard lock, 2 locks of 8 feet lift each, and one square drain.

Grubbing,	$20 00
4,026 cubic yards of embankment in tow path at 8 cts.	322 08
32,898 " " excavation in canal at 10	3,289 80
Sqnare drain,	12 00
Dam No. 9, 13 feet high,	8,616 65
Guard lock,	9,600 00
Locks No. 11 and 12, 8 feet lift each,	16,000 00
Tow path bridge No. 1, 300 feet long,	3,222 50
" " " " 2, " " "	2,787 50
" " " over canal,	742 00
	$44,612 53

SECTION No. 18.

The towing path re-commences on the usual side of the river and occupies favorable ground throughout the section. The grubbing is light. Two square drains will be required.

Grubbing,	$75 00
21,456 cubic yards of embankment at 8 cents,	1,716 48
2 square drains,	24 00
	$1,815 48

SECTION No. 19.

The ground to be occupied by the towing path is generally favorable. The grubbing is light, but continues throughout. Within the limits of this section are dam No. 10, 12 feet high and 396 feet long, and a guard lock with a lift of 8 feet

Grubbing,	$100 00
14,280 cubic yards of embankment at 8 cents,	1,142 40

2 square drains,	24 00
Dam No. 10, 12 feet high,	8,932 96
Lock No. 13, 8 feet lift.	9,600 00
	$19,799 36

SECTION No. 20.

This section is very favorable, but little embankment being required. The grubbing is light.

Grubbing,	$75 00
6,810 cubic yards of embankment at 8 cents,	544 80
	$619 80

SECTION No. 21.

The embankment on this section is light. The grubbing continues throughout. This section contains one dam, 12.8 feet high, a guard lock with a lift of 8 feet and 1 square drain.

Grubbing,	$100 00
5,346 cubic yards of embankment at 9 cents,	481 14
Square drain,	12 00
Dam No. 11, 12.8 feet high,	9,985 60
Lock No. 14, 8 feet lift,	9,600 00
	$20,178 74

SECTION No. 22.

The embankment required for the construction of a towing path along this section can be obtained with little expense, and the grubbing though continuous is light. The only extra work on it will be a bridge over Shy Beaver creek 60 feet long.

Grubbing,	$100 00
13,686 cubic yards of embankment at 8 cents,	1,094 88
Bridge 60 feet long,	495 00
	$1,689 88

SECTION No. 23.

Three-fourths of this section is favorable, the remaining portion however will be along a bluff, and of course expensive. The grubbing is light. It contains a dam 13 feet high and 396 feet long, a guard lock of 9 feet lift, and one square drain.

Grubbing,	$75 00
15,030 cubic yards of embankment at 8 cents,	1,202 40
Dam No. 12, 13 feet high,	9,801 00
Lock No. 15, 9 feet lift,	10,800 00
Square drain,	12 00
	$21,890 40

SECTION No. 24.

The river bank along this section is exceedingly rough, rendering the embankment required for the towing path expensive. The grubbing is light. A bridge 20 feet long will be required over Coffee run. This section passes Entriken's or Coffee run post office.

Grubbing,	$75 00
17,952 cubic yards of embankment at 9 cents,	1,615 68
Bridge 20 feet long,	280 00
For raising road bridge and abutments, 3 feet,	300 00
	$2,270 68

SECTION No. 25.

The embankment for the completion of this section will be somewhat expensive as the river bank is rough and rocky. The grubbing is light. It contains dam No. 13, 13 feet high and 330 feet long, and guard lock No. 16 with a lift of 8 feet.

Grubbing,	$75 00
13,056 cubic yards of embankment at 9 cents,	1,175 04
Dam No. 13, 13 feet high,	8,617 50
Lock No. 16, 8 feet lift,	9,600 00
	$19,467 54

SECTION No. 26.

For three-fourths of this section the construction of the towing path will be attended with little expense, on the remaining portion the river bank is exceedingly rugged. The grubbing is light throughout.

Grubbing,	$75 00
19,242 cubic yards of embankment at 9 cents,	1,731 78
	$1,806 78

SECTION No. 27.

This section will require more than the usual quantity of embankment, which will be somewhat difficult to obtain, on account of the rough bank on the slope of which the towing path will be formed. The grubbing will be very light. It contains a dam 16.3 feet high and 330 feet long and a guard lock with a lift of 12 feet.

Grubbing,	$50 00
18,573 cubic yards of embankment at 10 cents,	1,857 30
Dam No. 14, 16.3 feet high,	12,641 00
Lock " 17, 12 feet lift,	14,400 00
	$28,948 30

SECTION No. 28.

The embankment required for the construction of this section can be easily obtained. The grubbing is light. One square drain is necessary.

Grubbing,	$75 00
13,782 cubic yards of embankment at 8 cents,	1,102 56
Square drain,	12 00
	$1,189 56

SECTION No. 29.

This section will require an unusually large quantity of embankment, but throughout the greater portion it can be easily obtained. The grubbing is light. One square drain will be required.

Grubbing,	$75 00
31,872 cubic yards of embankment at 8 cents,	2,549 76
Square drain,	12 00
	$2,636 76

SECTION No. 30.

High bluffs present themselves on the river bank throughout the whole extent of this section, consequently the embankment will be heavy. It contains a dam of 17 feet high and 330 feet long, and a guard lock with a lift of 13 feet. The mouth of Trough creek is opposite this section.

Grubbing,	$50 00
17,514 cubic yards of embankment at 10 cents,	1,751 40
Dam No. 15, 17 feet high,	13,576 15
Lock. “ 18, 13 feet lift,	15.600 00
	$30,977 55

SECTION No. 31.

The embankment required for this section can be easily procured. The grubbing is very light. A bridge 70 feet long over James' creek will be necessary. Section No. 31 passes Entriken's mill.

Grubbing,	$75 00
23,676 cubic yards of embankment at 8 cents,	1,892 18
Bridge over James' creek,	500 80
	$2,467 88

SECTION No. 32.

The bank along this section is favorable for the construction of a towing path except for a short distance at the dam. The grubbing is generally light. It contains a dam 17.3 feet high and 264 feet long, and a guard lock with a lift of 14 feet.

Grubbing,	$100 00
12,525 cubic yards of embankment at 9 cents,	1,127 25
Dam No. 16, 17.3 feet high,	10,718 40
Lock “ 19, 14 feet lift,	16,800 00
	$28,745 65

SECTION No. 33.

The river bank along this section is generally favorable. The grubbing is uniform but light. Two square drains will be required.

Grubbing,	$100 00
12,266 cubic yards of embankment at 8 cents,	981 28
2 square drains,	24 00
	$1,105 28

SECTION No. 34.

The towing path throughout the greater part of this section is at the foot of the Slate bluffs, on which account an unusually large quantity of embankment will be required. The grubbing will be very light.

Grubbing,	$75 00
29,456 cubic yards of embankment at 9 cents,	2,651 04
	$2,726 04

SECTION No. 35.

This section is more favorable. The embankment will be heavy above the dam, but more will be requisite below it. The grubbing is exceedingly light. It contains a dam 19 feet high and 330 feet long, and a guard lock with a lift of 16 feet.

Grubbing,	$50 00
19,760 cubic yards of embankment at 9 cents,	1,778 40
Dam No. 17, 19 feet high,	16,486 55
Lock " 20, 16 feet lift,	19,200 00
	$37,514 95

SECTION No. 36.

Bluffs occupy one half of this section. The remaining portion is of a more favorable nature. The grubbing is light. Two square drains are necessary.

Grubbing,	$50 00
15,102 cubic yards of embankment at 9 cents,	1,359 18
2 square drains,	24 00
	$1,433 18

SECTION No. 37.

Throughout this section the ground occupied by the towing path is favorable, and the grubbing light. Two square drains will be required.

Grubbing,	$75 00
16,440 cubic yards of embankment at 8 cents,	1,315 20
2 square drains,	24 00
	$1,414 20

SECTION No. 38.

The towing path for about one-fourth of this section is placed along the foot of a slate bluff; for the remaining portion of it the ground is favorable. The grubbing is light and one square drain necessary.

Grubbing,	$75 00
34,974 cubic yards of embankment at 8 cents,	2,797 92
Square drain,	12 00
	$2,884 92

SECTION No. 39.

The unusual roughness of the river bank along this section renders a large quantity of embankment necessary. The grubbing will be light. A dam 18.4 feet high and 330 feet long, a guard lock with a lift of 15 feet, and a bridge 15 feet long will be required.

Grubbing,	$75 00
41,948 cubic yards of embankment at 9 cents,	3,775 32
Bridge 15 feet in length,	300 00
Dam No. 18, 18.4 feet high,	15,578 12
Lock " 21, 15 feet lift,	18.000 00
	$37,728 44

SECTION No. 40.

But one-third of this section is favorable. Throughout the remaining part the roughness of the river bank offers the same obstacles as in the preceding section. The grubbing is light.

Grubbing,	$75 00
21,180 cubic yards of embankment at 9 cents,	1,906 20
	$1,981 20

SECTION No. 41.

A large quantity of embankment will be requisite to form the towing path on this section, but the materials are easily obtained. The grubbing is light.

Grubbing,	$50 00
29,982 cubic yards of embankment at 8 cts.	2,398 56
	$2,448 56

SECTION No. 42.

Two-thirds of this section will be expensive on account of the roughness of the bank to be occupied by the towing path, the remaining portion is favorable. The grubbing is light. It contains a dam 19.7 feet high and 330 feet long, and a guard lock with a lift of 16 feet.

Grubbing,	$75 00
31,242 cubic yards of embankment at 10 cts.	3,124 20

Dam No. 19, 19.7 feet,	17,345 10
Lock No. 22, 16 feet lift,	19,200 00
	$39,744 30

SECTION No. 43.

The favorable nature of the ground renders the construction of this section very cheap. The grubbing is light, one square drain is required.

Grubbing,	$50 00
672 cubic yards of embankment at 8 cts.	53 76
Square drain,	12 00
	$115 76

SECTION No. 44.

This section resembles the preceding one as regards the expense of construction. The grubbing is also light. Two bridges, one 10 feet and the other 15 feet long, as well as one square drain will be required.

Grubbing,	$75 00
2,166 cubic yards of embankment at 8 cts.	173 28
Bridge 10 feet long,	72 50
" 15 feet long,	97 50
Square drain,	12 00
	$430 28

SECTION No. 45.

For more than half of this section the ground is favorable. The remaining portion will be expensive, the grubbing is light throughout. Two bridges, one 10 feet and the other 30 feet long will be required.

Grubbing,	$75 00
22,104 cubic yards of embankment at 9 cts.	1,989 36
Bridge 10 feet long,	117 50
" 30 feet long,	330 00
	$2,511 86

SECTION No. 46.

The river bank along the greater portion of this section is rough and will require much embankment. The grubbing is light.

Grubbing,	$50 00
39,210 cubic yards of embankment at 10 cts.	3,921 00
	$3,971 00

SECTION No. 47.

Although the quantity of embankment required for this section is great, it can be easily obtained and at small expense. The grubbing is uniformly light. A dam 17.6 feet high and 462 feet long and a guard lock with a lift 14 feet will be required.

Grubbing,	$75 00
40,296 cubic yards of embankment at 8 cts.	3,223 68
Dam No. 20, 17.6 feet high,	19,325 46
Lock No. 23, 14 feet lift	16,800 00
	$39,424 14

SECTION No. 48.

The towing path of this section occupies good ground, and the embankment required can be had at a small expense. The grubbing is generally light.

Grubbing,	$75 00
30,072 cubic yards of embankment at 8 cts.	2,405 76
	$2,480 76

SECTION No. 49.

Two-thirds of this section is very favorable, the remaining third will require a large amount of embankment. The grubbing is occasionally heavy. A dam 18 feet high and 330 long and a guard lock with a lift of 14 feet will be required.

Grubbing,	$100 00
23,880 cubic yards of embankment at 9 cts.	2,149 20
Dam No. 21, 18 feet high,	14,348 40
Lock No. 24, 14 feet lift,	16,800 00
	$33,397 60

SECTION No. 50.

This section is generally favorable. But little embankmennt and that easily obtained is required. It will be necessary to excavate about 1000 cubic yards of slate. The grubbing is uniformly light.

Grubbing,	$100 00
2,868 cubic yards of embankment at 9 cts.	258 12
1,000 " " slate excavation at 25 cts.	250 00
	$608 12

SECTION No. 51.

The embankment necessary for this section can be obtained at little expense. The grubbing is heavy in places. A dam 12 feet high and 300 feet long, a guard lock with a lift of 9 feet, and one square drain will be required.

Grubbing,	$150 00
18,684 cubic yards of embankment at 8 cts.	1,494 72
Square drain,	12 00
Dam No. 22, 12 feet high,	6,873 00
Lock No 25, 9 feet lift,	10,800 00
	$19,329 72

SECTION No. 52.

The quantity of embankment is small, but will be expensive on account of the roughness of the river bank. The grubbing is light.

Grubbing,	$75 00
7,710 cubic yards of embankment at 10 cts.	771 00
	$846 00

SECTION No. 53.

The embankment required for this section can be obtained at little expense, on account of the favorable ground occupied by the towing path. The grubbing is light. A dam 13.7 feet high, and guard lock with a lift 9.7 feet will be required.

Grubbing,	$75 00
17,772 cubic yards embankment at 8 cts.	1,429 76
Dam No. 23, 13.7 feet high,	7,585 16
Lock No. 26, 9.7 feet lift,	11,640 00
	$20,721 92

SECTION No. 54.

The section terminates at the mouth of the Raystown branch of the Juniata, where it connects with the Pennsylvania works. A towing path bridge, of 924 feet in length across the main Juniata will be necessary in order that the slackwater navigation and state canal may communicate with each other in the most perfect manner.

Grubbing,	$50 00
510 yards cubic embankment at 9 cts.	45 90
Trimming towing path,	200 00
Towing path bridge 924 feet long,	14,983 00
	$15,278 90

RECAPITULATION.

Section	No.	ESTIMATED COST OF		Section	No.	ESTIMATED COST OF	
Section	No. 1	$1,075	17	Section	No. 28	1,189	5
do	2	1,455	94	do	29	2,636	7
do	3	29,095	83	do	30	30,977	5
do	4	5,767	42	do	31	2,467	8
do	5	39,466	93	do	32	28,745	6
do	6	21,630	86	do	33	1,105	2
do	7	148	60	do	34	2,726	0
do	8	18.846	22	do	35	37,514	95
do	9	16,439	35	do	36	1,433	18
do	10	2,096	70	do	37	1,414	20
do	11	16,936	73	do	38	2,884	92
do	12	21,863	38	do	39	37,728	44
do	13	20,233	19	do	40	1,981	20
do	14	921	80	do	41	2.448	56
do	15	15,604	50	do	42	39,744	30
do	16	1,847	28	do	43	115	76
do	17	44,612	53	do	44	430	28
do	18	1,815	48	do	45	2,511	86
do	19	19,799	36	do	46	3,971	00
do	20	619	80	do	47	39,424	14
do	21	20,178	74	do	48	2,480	76
do	22	1,689	88	do	49	33,397	60
do	23	21,890	40	do	50	608	12
do	24	2,270	68	do	51	19,329	72
do	25	19,467	54	do	52	846	00
do	26	1,806	78	do	53	20,721	92
do	27	28,948	30	do	54	15,278	90
				Estimated total cost,		$710.643	92

The Report of Charles De Hass, Engineer, accompanied with a survey and estimate of the cost for constructing a M'Adamized or Block road, from Laughlinstown to Chambersburg.

READ, February 8, 1839.

In pursuance of my appointment as engineer, made in accordance o sundry resolutions passed at unanimous meetings held by citizens f Westmoreland, Somerset, Bedford and Franklin counties, a survey vas made during the late season, of a route for a M'Adamized (or lock) road, at two and a half degrees from the western base of Lauel Hill near Laughlinstown to Chambersburg, and now beg leave to resent a detailed report and estimates of the probable cost of the ame.

After having ascertained (by running a crest line) the lowest and nost favorable point for crossing the Laurel Hill, the survey and location was commenced at a suitable point on the line of the proposed ail-road, from that place to Pittsburg as surveyed in 1836. Thence scending said hill, the line passes on the south of the present turnike, crossing the same to the north a short distance west of Clifford's nn, thence to the summit of the hill immediately north of the present oad. Thence descending the eastern side, the line generally keeps n the south of said road to Jennerville. Thence the line runs conguous to the present turnpike, frequently changing from one side to he other, passing near Bean's store, "at the Cross roads," and crossng Queamahoning creek, thirty chains south of the turnpike bridge; hence ascending and crossing the turnpike to the north near Bucher's nn, from this the line generally pursues the course of the turnpike to he borough of Stoystown, except a few points where a change was ound necessary to obtain the proper grade; previous to the location f the road to that borough the country north and south of the present urnpike was thoroughly and carefully examined, which induced me o believe that no other more favorable route could be found, and accordingly that route was adopted. Thence the line descended to Stony creek, crossing the same a short distance below the turnpike ridge; thence ascending a spur of the Allegheny mountain which pproaches the stream at this point, a considerable deviation from the resent turnpike was here unavoidable; however, the grade again caried us to the turnpike near the summit of Sarber's hill; thence the ine passed on in the immediate vicinity of said road to Statler's inn near the summit of the Allegheny mountain; before proceeding with the location east of this, the level was run along the summit of the mountain, to ascertain the greatest depression, and the most favorable point for crossing the same. This resulted in giving a preference to the "Deer Lick gap" which was found to be 113.35 feet below that over which the present road passes, and about a mile north of the same; the line was therefore continued in a direction to that summit, passing over an extensive bed of bituminous coal, owned by John Statler, Sen. It may not be improper here to remark, that the whole region of country between the Laurel hill and this point, abounds in that mineral to a considerable extent. Thence descending the eastern side of the mountain, the grade carried the line exclusively on the north side of the turnpike to a point near General Burns' inn; from thence the line passes principally along on the south side of the turnpike to the borough of Schellsburg, and from thence to the borough of Bedford, the line pursues generally the course of the present turnpike; considerable amount of excavations and embankments will be requisite on the first three miles, east of Schellsburg this would also have to be encountered on a new location, inasmuch as there are several ridges of considerable length, running at right angles to the line, which would have to be surmounted on any other route; distance to Bedford, 50 miles and 17 chains; from Bedford to the great crossing of the Juniata few changes of any importance were made on the route of the present turnpike, the north side of the Juniata from a point a short distance below Bedford has a decided advantage over that of the south, the spurs of the mountains and hill generally, have a southern exposure, and are less precipitous than on the south side. After crossing the stream on the present turnpike bridge, the line continued a short distance on the present road, then it was found necessary to run a full ascending grade so as to reach the summit near Householder's inn, which was affected without any material increase of distance. From this point to the western base of Ray's hill near Neighcum's inn, several lines were run to ascertain the shortest and most favorable route, which resulted in the adoption of a route of the present road; which, however, will require a considerable amount of excavations and embankments to reduce it to a proper grade—it was, nevertheless, deemed less expensive, and the road much shorter than that of a new location. Thence ascending Ray's hill we were enabled to reach a gap in the summit, 58.30 feet lower than that over which the present road passes; thence descending to Sprout's inn, at the junction of the three mountain road with the turnpike, from a point a short distance east of said inn, a regular ascending grade was run to the summit of Sideling hill near the present road: here on an examination of the country castwardly. it was ascertained that a route could be located down the east side of said hill, which would have a southern exposure, therefore the line was accordingly run along the hill opposite to the turnpike and intersecting the same at Reamer's inn; thence on and near the turnpike to Licking creek. The country between this and the borough of M'Connelsburg, was found on exploration and a careful examination to present some difficulty to determine, without an actual survey the best and shortest route; two lines were therefore run, the first passing a considerable distance north of the present turnpike, crossing east Scrub ridge at the "Warriors Gap" and the other as near as practicable to the present road, the former avoids west Scrub ridge, and has also the preference with regard to distance, whilst the latter passes over west and east Scrub ridge, and consequently has a greater portion of heavy grades.

Before proceeding with the survey east of this place, the level was run along the summit of the Cove mountain, to ascertain its greatest depression; the gap immediately north of the Mercersburg turnpike was fonnd 163.94 feet below that over which the Chambersburg turnpike passes, and accordingly the line from McConnellsburg was run to that summit; and from thence the best and nearest route to Loudon was found round the spur of the mountain, north of the paper mill gap, and thence on, and adjacent to, the turnpike through St. Thomas' to Chambersburg. This division will require at several points a considerable amount of excavation and embankment, which was believed would not cost as much for work and damages as that of a new route. Distance from Bedford, 61 miles and 13 chains, and the total length 111 miles and 30 chains, being an increase only of about 10 miles over the present road.

A route was also surveyed from a point on the former route, east and near the summit of Cove mountain, descending round the spur of the mountain south of the paper mill gap, to the borough of Mercersburg, the total distance to this place is nearly 101 miles, being 10 miles shorter than the route to Chambersburg.

At the request of the citizens of Mercersburg, an experimental route for a rail-road from that place to Green Castle, was surveyed, which resulted favorable for such a work, the country being remarkably well adapted for an improvement of that kind. The distance will scarcely be one mile greater than that of the turnpike between those places. The extension of the Franklin rail-road to that borough, would unquestionably prove highly beneficial to that work, inasmuch as it would open a communication to an immense and populous region of country, which for fertility of soil and high state of cultivation, is not surpassed by any section of the state. These people have been deprived of any of those advantages afforded by our public improvements to almost all other sections of the state, and for the construction of which they have bore their proportionable part; it therefore seems but justice that they should be aided by the state in the construction of such a work, by which they would be enabled to send their immense surplus production to market in a cheap and expeditious manner. And in the event of the completion of the Franklin rail-road to the Chesapeake and Ohio canal, as contemplated, by which a communication would be opened to the Pennsylvania coal region, as well as that of Maryland, in the vicinity of Cumberland when no doubt vast quantities of that mineral would find a ready mar' at Mercersburg, and neighboring parts. And by the conmotives will be able to traverse a rail-road over those *towering* mountains with numerous acute curves at the same speed, it would would require upwards of 24 hours to perform the trip from Chambersburg to Pittsburg—this is going on the supposition that they will be able to run at night, which is extremely doubtful, particularly through the mountainous parts of the country, in that event it would require more time. And with regard to the fare for the conveyance of passengers, and the cost of transportation, it is confidently believed from a careful calculation, that it would be in favor of a McAdamized (or block) road.

Apprehensions are also entertained by many experienced gentlemen, that the early *frosts* and *deep snows* in that mountainous region, would tend in a great measure to destroy the utility and use of the rail-road during that season of the year, when our canals are closed, and consequently all our communications would be stopped at the same time. The almost daily impediments on the Philadelphia, Harrisburg, and Chambersburg rail-road during the winter season, go far to confirm these forebodings. Therefore, the necessity and importance of constructing a McAdamized (or block) road over that elevated and undulating region of our state, in preference to that of a rail-road, as the former would cost several millions of dollars less than the latter, and equally permanent and useful at all *seasons* of the *year.*

CHARLES DE HASS,
Harrisburg, Pa. Feb. 5, 1839. *Engineer.*